PB88-145081

Superfund Record of Decision (EPA Region 1)
Davis Liquid Waste Site
Smithfield, Rhode Island
(First Remedial Action) September 1987

(U.S.) Environmental Protection Agency
Washington, DC

29 Sep 87

U.S. Department of Commerce
National Technical Information Service
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16. ABSTRACT

The Davis Liquid Waste site is located in a rural section of the Town of Smithfield, Providence County, Rhode Island. The 15-acre site, bounded on the north and south by wetlands and swamp areas, is within one-half mile of 38 homes. Throughout the 1970s, the site served as a disposal location for various hazardous liquid and chemical wastes including: paint and metal sludge, oily wastes, solvents, acids, caustics, pesticides, phenols, halogens, metals, fly ash and laboratory pharmaceuticals. Liquid wastes were accepted at the site in drums and bulk tank trucks and were dumped directly into unlined lagoons and seepage pits. This dumping has resulted in soil, surface and ground water contamination that still persists. Periodically the semi-solid lagoon materials were excavated and dumped in several onsite locations and covered with available site soil. Other site operations included the collection of junked vehicles, machine parts, metal recycling and tire shredding. In 1978 the discovery of offsite well contamination prompted the State Superior Court to prohibit dumping of hazardous substances on the Davis property. Presently, 11 acres of the property operate as a staging and storage area for approximately 30 to 35 million tires. In July 1985, a removal action shipped 600 intact and crushed drums offsite. Significant quantities of hazardous substances still exist in the ground water, surface water, sediments and soils. The primary contaminants of concern include: VOCs, organics, inorganics, metals, arsenic, benzene, (See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Davis Liquid Waste, RI First Remedial Action - Final Contaminated Media: gw, sw, sediments, soil Key contaminants: VOCs, organics, TCE,1-1-DCE,inorganics, metals, arsenic, benzene		

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16. ABSTRACT (continued)

TCE and 1,1-DCE.

The selected remedial action includes: excavation of 25,000 yds^3 of raw waste and contaminated soils with onsite incineration; backfilling with some treated oils; onsite disposal of other treated soil in RCRA landfill; alternate water supply; onsite ground water treatment involving air stripping, carbon absorption and recirculation of treated water to the aquifer. The estimated present worth cost for this remedial action is $27,392,000.

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R01-87/022
September 1987

PB88-145081

EPA

Superfund Record of Decision:

Davis Liquid Waste, RI

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Record of Decision

Remedial Alternative Selection

Site Name and Location

Davis Liquid Waste Site
Smithfield, Rhode Island

Statement of Purpose

This Decision Document represents the selected remedial action for this site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP); 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended. The Region I Administrator has been delegated the authority to approve this Record Of Decision.

The State of Rhode Island has concurred on the selected remedy and determined, through a detailed evaluation, that the selected remedy is consistent with Rhode Island laws and regulations.

Statement of Basis

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the information repositories (index attached). The attached index identifies the items which comprise and administrative record upon which the selection of a remedial action is based.

Description of the Selected Remedy

The selected remedy for the Davis Liquid Waste site is a comprehensive approach for site remediation which includes both a source control and management of migration component.

The source control component entails:

- Excavation of 25,000 cubic yards of raw waste and contaminated soils located in the unsaturated zone and treatment on-site in a mobile incineration facility. The health-based cleanup level for on-site soils corresponds to a 10^{-5} cancer risk level. All soils with volatile organic concentrations above 2ppm will be excavated and treated by incineration to reduce total volatile organic concentrations to below the 2ppm cleanup level. Treated soils will be tested for EP toxicity. Those soils with concentration that are below the EP toxicity levels will be used to backfill excavated areas. The soils with concentrations above the EPA toxicity levels will be placed in a RCRA Subtitle C landfill on-site. The source control component of the remedy will require one year of design and contruction and two years of operation to treat the 25,000 cubic yards of material.

The management of migration components will include:

- The design and construction of an alternative water supply to residents affected by contaminants migrating off-site in groundwater into private wells on Log Road and Burlingame Road. The waterline will be constructed prior to construction of the remedial alternative.

- Active restoration of the overburden and bedrock aquifers contaminated with volatile organic compounds (VOCs) using on-site treatment involving air stripping and carbon adsorption and recirculation of treated water to the aquifer. Groundwater will be treated to reduce contaminants to levels which result in an excess cancer risk of 1×10^{-5}, assuming additivity. EPA estimates that this target remediation level can be achieved within 5 to 10 years.

- The total estimated present worth cost of the remedial alternative is $27,805,000: $14,900,000 for the source control component, $10,005,000 for the management of migration component, and $2,900,000 for the waterline.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the statutory preference for treatment that permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances pollutants and contaminants, as a principle element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

9/29/87
Date

Michael R. Deland
Regional Administrator

Davis Liquid Waste Superfund Site
Record of Decision Summary

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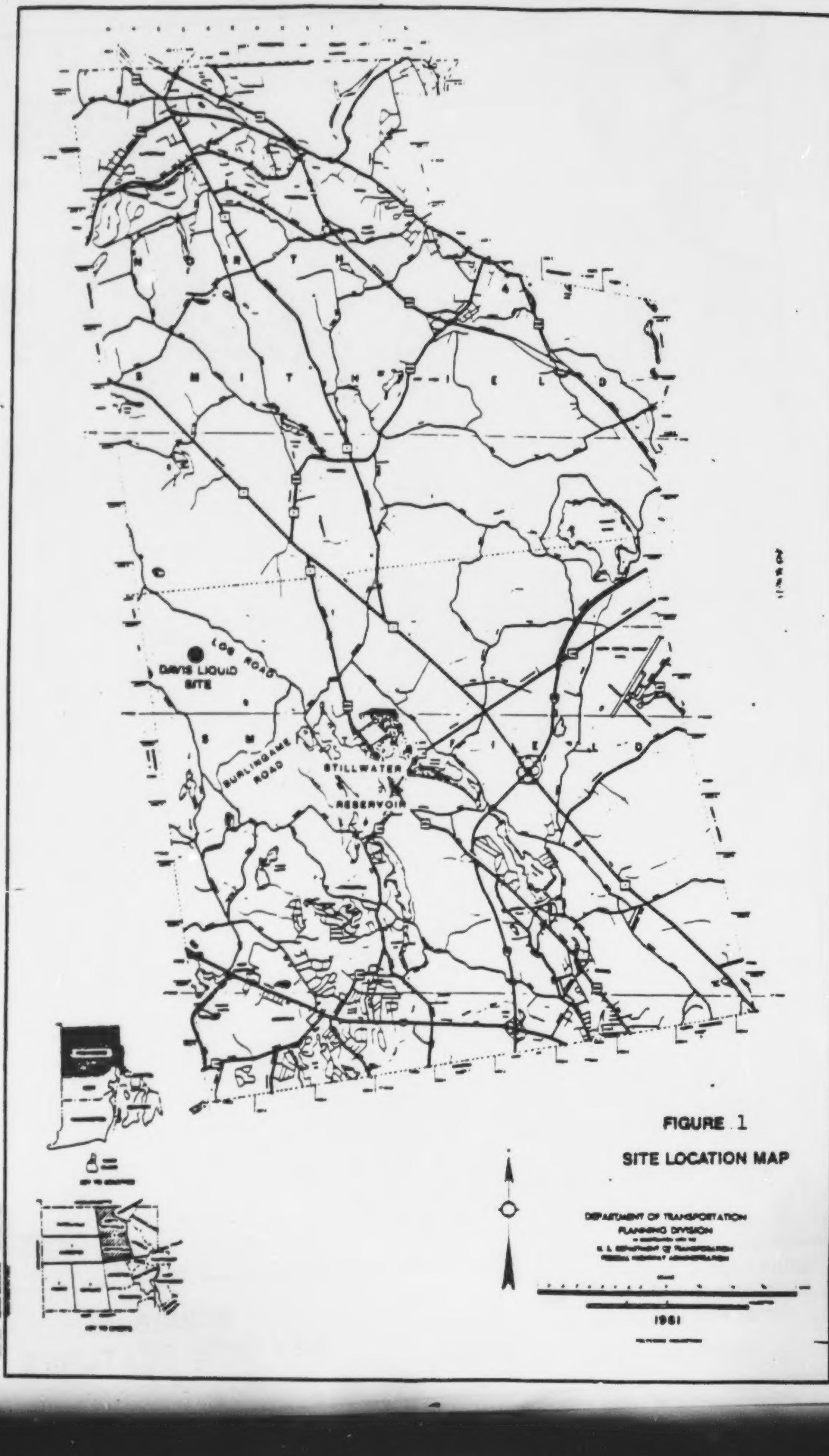
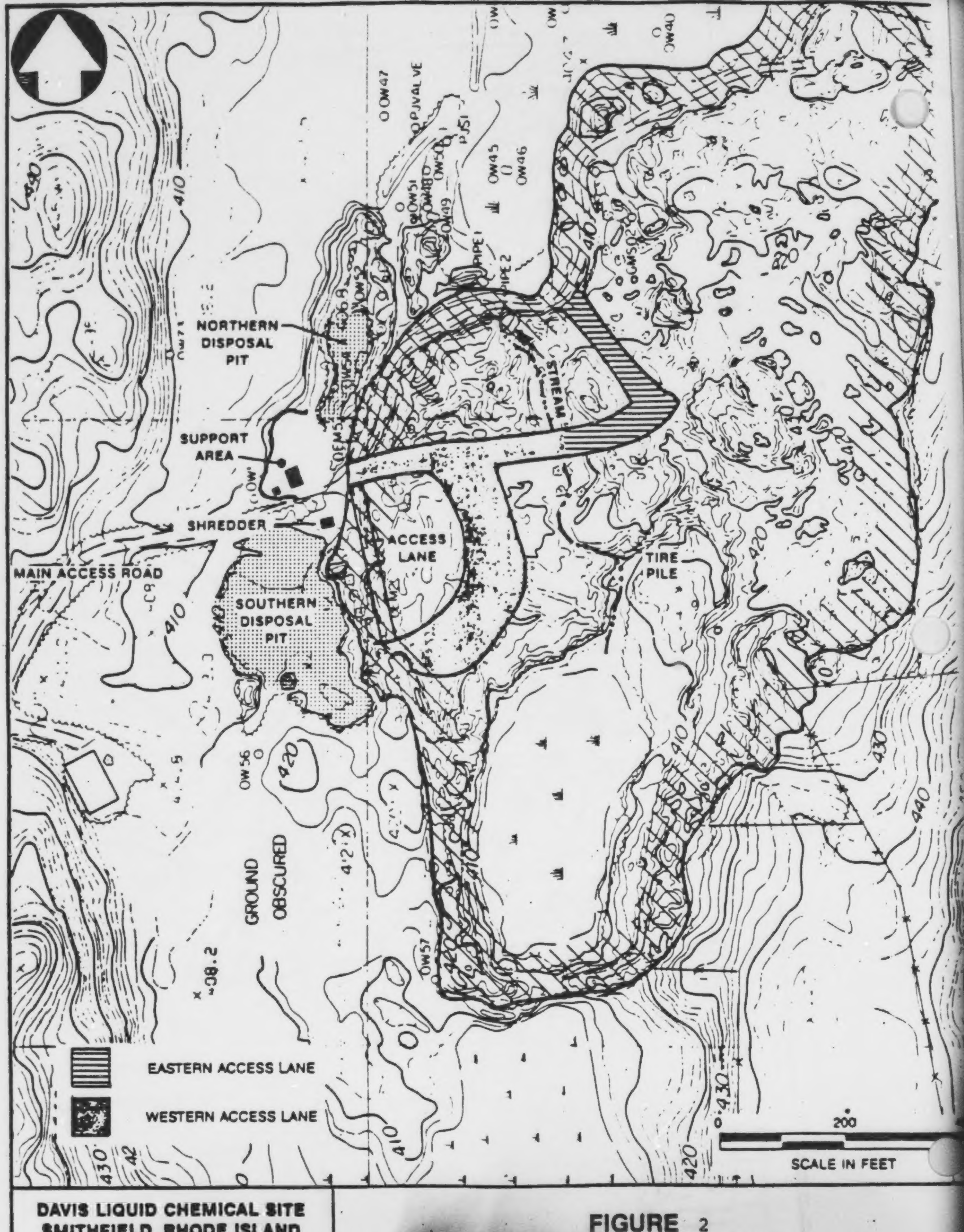

NORTH SMITHFIELD
SMITHFIELD
LOG ROAD
DAVIS LIQUID SITE
BURLINGAME ROAD
STILLWATER RESERVOIR
DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION
1961

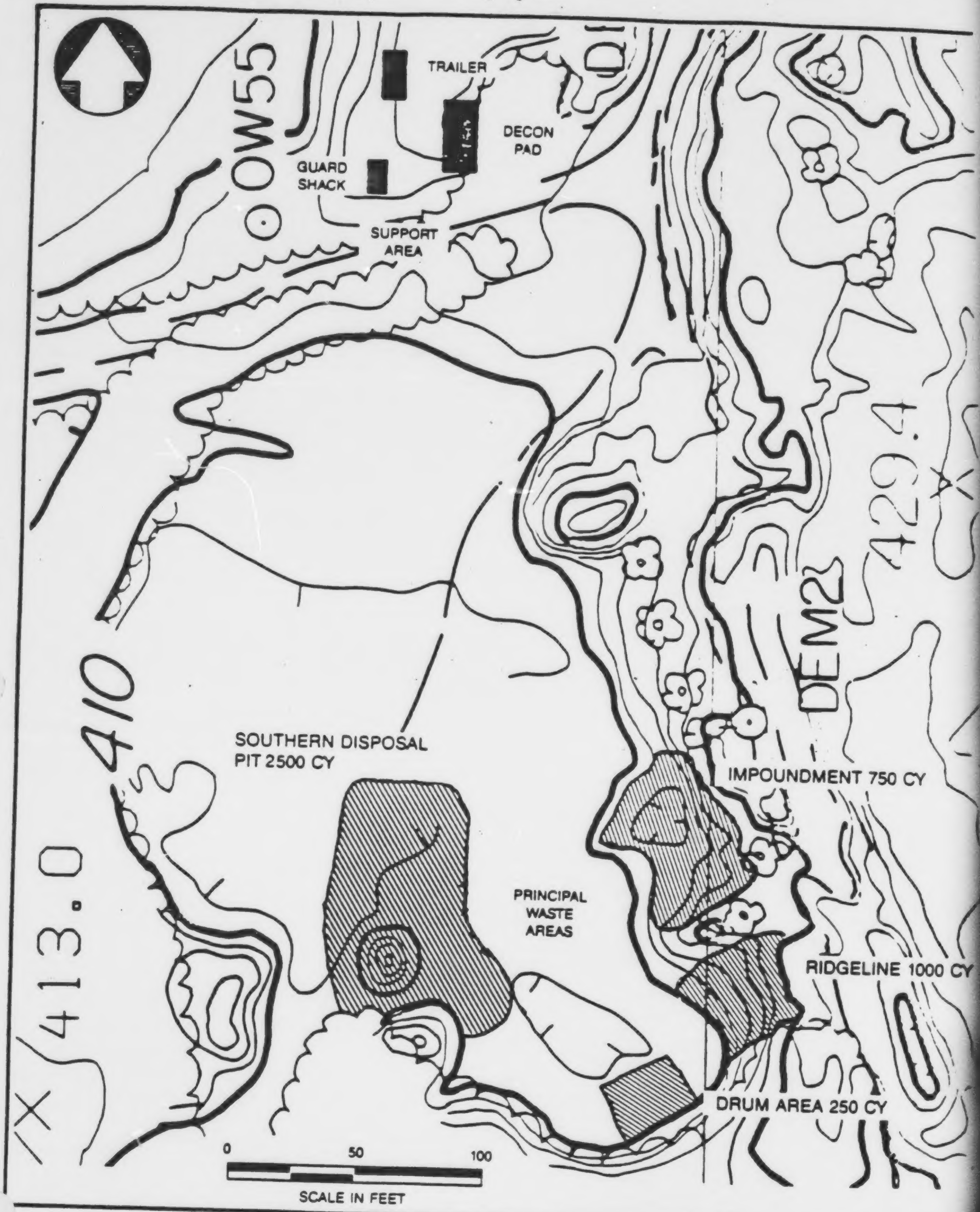
FIGURE 1

SITE LOCATION MAP


NORTHERN DISPOSAL PIT
SUPPORT AREA
SHREDDER
MAIN ACCESS ROAD
SOUTHERN DISPOSAL PIT
ACCESS LANE
STREAM
TIRE PILE
GROUND OBSCURED
EASTERN ACCESS LANE
WESTERN ACCESS LANE
0
200
SCALE IN FEET
OW47
OW45
OW46
OW40
OW56
OW57
PIPE 1
PIPE 2
PJ51
410
420
430
440

DAVIS LIQUID CHEMICAL SITE
SMITHFIELD, RHODE ISLAND
Camp Dresser & McKee Inc.
SOURCE: EPA (E.M.S.L.)

FIGURE 2
KEY SITE FEATURES


OW55
TRAILER
DI
DECON PAD
GUARD SHACK
SUPPORT AREA
429.4
DEM2
410
SOUTHERN DISPOSAL PIT 2500 CY
IMPOUNDMENT 750 CY
PRINCIPAL WASTE AREAS
RIDGELINE 1000 CY
413.0
DRUM AREA 250 CY
0
50
100
SCALE IN FEET

DAVIS LIQUID CHEMICAL SITE
SMITHFIELD, RHODE ISLAND
Camp Dresser & McKee Inc.

SOURCE: EPA (E.M.S.L.)

FIGURE 3
SOUTHERN DISPOSAL AREA
PRINCIPAL WASTE AREAS

ROD DECISION SUMMARY
DAVIS LIQUID WASTE SUPERFUND SITE,
Smithfield, Rhode Island

I. Site Name, Location and Description

The Davis Liquid Waste Superfund Site ("The site") is located on the property of William and Eleanor Davis in a rural residential section of the Town of Smithfield, Providence County, Rhode Island (see figure 1). The 15 acre site served as a disposal location for a variety of liquid and solid hazardous wastes, throughout the 1970's. In June 1982 the site was placed on the Interim National Priorities List (NPL) and a Cooperative Agreement was signed between the EPA and the State of Rhode Island giving the State the lead management to perform a Remedial Investigation/Feasibility Study (RI/FS). On December 31, 1982, the site became part of EPA's "Proposed NPL " of hazardous waste sites and was listed as a final NPL site in September of 1983. Presently the site ranks as number 208 out of 703 NPL sites on the NPL update published on June 10, 1986.

The site is bounded on the east and west by forested uplands, and on the north and south by wetlands and swamp areas. Land within one mile of the site is semi-rural in nature and undeveloped and wooded with occasional developed cleared areas and scattered wetlands. Developed land, within one mile of the site is dominated by low density residential uses.

There are 38 homes within one half mile of the site and 100 homes within one mile of the site. Development in the area is increasing and several new homes have been observed under construction along Burlingame Road to the southeast of the site.

There are three discrete areas of important natural resources in the vicinity of the site: (1) surrounding wetlands; (2) the aquifers underlying the site damage area; and (3) Stillwater Reservoir. The wetlands surrounding the site are a portion of the Nipsachuck Swamp which forms the headwaters for Latham Brook. Latham Brook receives tributary surface and groundwater from the site and flows southeast about one and a half miles to Stillwater Reservoir. Inland wetlands, such as the Nipsachuck Swamp, are valuable since they provide flood storage and habitat for many wetland plant and animal species. In addition, two groundwater aquifers underlie the site and the surrounding area: the overburden aquifer, which is shallow, and the bedrock aquifer at much greater depths. Each of these aquifers is currently tapped by local residents as their sole source of water supply. Stillwater Reservoir located about one and a half miles downstream from the site is classified as a Class B water body and is a potential water supply for the Town of Smithfield.

II. Site History

Throughout the 1970's the site served as a disposal location for various hazardous liquid and solid chemical wastes. Liquid wastes brought to the site in tank trucks were dumped into several unlined lagoons and seepage pits. Periodically the semi-solid materials from the lagoons were excavated and dumped in several locations on site and covered with available site soil.

In 1978 in response to the discovery of off-site contamination in private residential and monitoring wells, the Rhode Island State Superior Court issued a permanent injunction against dumping of hazardous substances on the Davis property. Presently, the site operates mainly as a staging and storage area for tires. It is estimated that approximately 30 to 35 million tires are stored on the site covering an area of approximately 11 acres. Other site operations included the collection of junked vehicles, machine parts, recycling of metal and shredding of tires.

Liquid wastes were accepted at the site both in drums and in bulk tank trucks and were dumped directly into unlined pits in the ground. From these sources, contamination of surrounding soils and surface and ground water occurred and still persists today. Because very few records exist concerning the waste products disposed of, and the disposal practices, it is difficult to estimate the volume of waste disposed of at the site.

However, some general categories of wastes were determined in the course of conducting the RI/FS. The wastes include "neutralized wastes" from incinerated toxic materials; drums brought to the site containing chemical and sewage sludges, waxes and liquids; and liquids dumped from tanker trucks included organic solvents. Waste categories include:

Sludge	-	paint pigments, metals
Oil	-	oily wastes
Solvents	-	halogenated and non-halogenated
Chemicals	-	acids, caustics, pesticides, phenols, halogens, metals
Solids	-	fly ash, metals
Other	-	laboratory pharmaceuticals

The Northern Disposal Pit is 7,600 square feet in size. It received liquid wastes consisting primarily of solvents and liquid chemicals. In 1978, the remaining contents of the Northern Disposal Pit area were spread along the logging road which runs through the site. The Southern Disposal Pit is 47,600 square feet in area. Primarily bunker oil sludges and chemical waste sludges were disposed there.

In July 1985 the Region I Environmental Services Division declared that leaking barrels of hazardous waste found on the site posed an imminent and substantial danger to public health and the environment. A removal action consisting of shipping approximately 600 intact and crushed drums off-site was conducted from August 1985 to February 1986 at a cost to the government of $230,000.

Data collected from all prior investigations and the Remedial Investigation (RI) between October 1984 and September 1985 indicate that significant quantities of hazardous substances still exist at the site. Contamination was found in groundwater, surface water, sediments and soils both on-site and off-site.

In addition to finding hazardous substances and contaminated soils on-site, the investigations show that the underlying overburden and bedrock aquifers have been contaminated. These same aquifers are used as water supplies by the surrounding residences.

Six specific areas have been identified which contain material that will require treatment or disposal: the Western Access Road, the Northern Disposal Pit, the Southern Disposal Pit, the drum staging area, the ridge line area, and the bunker oil impoundment. The Western Access Road and the Northern Disposal Pit are shown in Figure 2. The other four defined areas, which are located in the Southern Disposal Pit area, are shown in Figure 3. The contaminants found in each on-site area vary depending on the types of wastes dumped there. For example, the Northern Disposal pit contamination was caused mainly by liquid chemicals and solvents. Consequently, constituents such as toluene and total xylenes were found there in high concentrations. The highest average concentration of total volatiles was found in the Southern Disposal Pit and Bunker Oil Impoundment. The contaminated natural resources include the groundwater aquifers, the surface water and sediments of Latham Brook, and the wetlands in close proximity to the site. Volatile organic contamination was found in excess of 100 ppb at the headwaters of Latham Brook, and was also found as far downstream as 1.1 miles from the site. Inorganic data collected for Latham Brook and surrounding wetlands show that fresh water aquatic life may be threatened by offsite lead and nickel concentrations which exceed federal aquatic toxicity criteria for chronic effects.

A large portion of the site wetlands have also been altered due to on-site activities. These activities include the direct filling of wetlands with tires and waste material. As a result, water elevations have increased causing a large area of stressed wetlands vegetation.

Contaminant pathways for migration include infiltration of contaminants from the disposal pit areas into the overburden and bedrock aquifers. The regional groundwater flow is to the east and southeast toward Log and Burlingame Roads. The overburden aquifer flow is contained to some degree by a bedrock dike which is perpendicular to the overburden groundwater flow. The surface water contamination from the site discharges in a northwesterly direction contaminating the surface waters of Latham Brook.

Groundwater contamination is characterized by high levels of volatile organics, low levels of extractable organics, and wide spread inorganics. The boundary of the 1-1,000 parts per billion (ppb) range of total volatile organic contamination in the bedrock groundwater extends approximately 890 feet from the site towards the bedrock dike and is approximately 400 feet wide. Data indicates higher levels of contamination in the bedrock aquifer along the western edge of the bedrock dike than in the overburden (shallower) aquifer. The bedrock aquifer therefore poses a long-term potential source of groundwater contamination.

Twenty-three domestic drinking water wells near the site have shown contamination by hazardous waste substances at least once during their sampling history. The peak levels of residential well contamination were detected in 1980 shortly after the site became inactive as a hazardous waste dump. Sampling of residential wells throughout the 1980's shows a progressive decrease of concentration of contaminants, however, the agency cannot be assured that they will continue to do so.

Constituents found in offsite residential well water included those shown to be migrating from the site. Trichloroethylene, 1,1-dichloroethylene, and benzene have all been measured in residential wells and in the groundwater at the site at levels exceeding EPA's proposed Maximum Contaminant Levels (MCLs). A "worst-case" scenario (assuming lifetime ingestion of the maximum measured levels of potential carcinogens) indicates that a total excess cancer risk of 10^{-3} (one in one thousand) may be associated with ingestion of well water. This estimated risk is primarily attributable to the ingestion of arsenic. Arsenic is naturally occurring in the area as well as chemical contamination placed while the dumping was active. Ingestion of the noncarcinogens, in particular total xylenes, 1,1-dichloroethylene and lead, at the maximum measured concentration in well water could also pose a hazard to residents. Exposure to the organics measured in private wells can be expected to occur as the chemicals volatilize into indoor air during household use of water and are subsequently inhaled. This inhalation risk, coupled with estimated ingestion exposures, suggests an increased total risk to residents.

On-site workers may be exposed to unsafe levels of arsenic through inhalation of soil dusts and inadvertent ingestion of surface soils during excavation. The lifetime excess cancer risk associated with the most-probable arsenic exposure estimate is 10^{-6} (one in one million) and with the worst-case exposure estimate is 10^{-4} (one in ten thousand).

Ingestion of contaminated soils onsite and inhalation of volatilized organics from onsite soils pose a significant present and future risk to human health.

III. Enforcement History and Satus

To date, the United States has not initiated a cost recovery acti relating to activities at the site. In September 1985, however, the United States did bring an action in the U.S. District Court for Rhode Island against members of the Davis family in order to ensure access for the Agency to complete a RI/FS. In that action, the Court entered an Order allowing the RI/FS field work to proceed and prohibiting the members of the Davis family for interfering with the RI/FS work.

The Agency has issued notice letters to four members of the Davis family as owner-operators. These letters are based on information obtained in other lawsuits filed against Mr. Davis, Sr.; on testimony provided by Mr. Davis; on responses to EPA information requests; and on title searches.

In addition, the Agency has issued approximately 20 notice letters to various companies as generators of hazardous substances which went to the Davis site. Those notice letters are based upon information obtained in state court lawsuits involving Mr. Davis, from testimony of Mr. Davis and from drums discovered at the site. In December 1985, the noticed generators declined to conduct the off-site removal of drums at the site.

The Region plans to send out special notice letters to the appropriate PRPs (including the Davis family) following issuance of the ROD. Since the number of generators will probably be small and the owner/operators have in the past not been cooperative, the Region does not anticipate that issuance of special notice letters will trigger productive negotiations.

IV. Community Relations: Involvement and Concerns

Groundwater and surface water contamination and the potential health effects from this contamination have been the principle concerns of the community surrounding the site for more than ten years. The possibility of a second tire fire and delays in cleanup have also been concerns.

Residents first became aware of extensive truck activity at the Davis property in the mid-1970s and neighbors complained to local and State officials of acid chemical smells emanating from the property. A tire fire at the site in 1977 and a subsequent investigation into the cause of the fire prompted a group of approximately six to eight residents to bring their concerns to the attention of the Smithfield Town Council. Anxious to expedite site activities and dissatisfied by an apparent lack of response, this group of residents approached the Conservation Law Foundation of Rhode Island for assistance. In 1978, they were successful in obtaining a court order barring further hazardous waste disposal at the site. However, the court order did not prohibit the disposal of non-hazardous wastes at the site and a core group of active citizens, using the name "Dump the Dump", lobbied the Smithfield Town Council for closure of the site and closure of the nearby GSR landfill. They also initiated legal and investigative actions against Mr. Davis, the site owner.

Beginning in 1978, State efforts to gain access and investigate the site were met with a series of legal challenges by Mr. Davis, which resulted in long delays in addressing possible contamination problems at the site. (Offsite sampling had revealed the presence of organic chemicals in off-site surface water). Citizens of Smithfield became frustrated due to these long delays, and legal challenges by Mr. Davis.

In 1980, the Rhode Island Department of Environmental Management (RIDEM) received permission from the Rhode Island Superior Court to conduct a full-scale groundwater contamination study involving drilling and sampling of wells on the Davis property. Chemical contaminants were found in both groundwater wells and surface water adjacent to the site. However, further delays in the study of the site resulted from lack of cooperation from Mr. Davis, and citizen activity dwindled between 1980 and 1983. In June of 1986, the site was placed on the EPA's National Priorities List, making it eligible for federal funds under Superfund. EPA began the RI/FS in October of 1984, after preliminary work was conducted by RIDEM. During the winter of 1985, EPA removed approximately 600 drums containing hazardous waste. In November of 1986, EPA completed the RI which assessed the contamination in soils, groundwater, and surface water, and in the vicinity of the site.

In the past several years, citizens' concerns have focused on EPA's findings of low levels of contamination in 23 residential wells near the site. Contaminants were detected in several of these wells at concentrations above EPA health advisory levels for drinking water. Since discovery of this contamination, RIDEM has supplied bottled water to six of the residents whose wells have shown contaminant levels above EPA criteria. Residents who are not being supplied with bottled water continue to fear that either their wells may become contaminated or levels of existing contamination will increase and are hopeful that EPA will approve installation of a permanent water supply to serve that area around the site. Since completion of EPA's draft FS, residents near the site are currently focusing their concern on the safety of the proposed incineration process and the emissions that will result from its operation.

An FS report describing the proposed alternatives for an alternate water supply was made available for public comment from May 28 to June 8, 1987. A public meeting was held and oral comments were received during the comment period and are summarized in a Responsivness Summary contained in the Administrative Record.

Community interest is very high concerning the investigation of contaminated residential wells in the vicinity of the site. At a public meeting held on June 24, 1986 to discuss the results of the Remedial Investigation, the topic of a plan for providing an alternate water supply to affected residents was discussed. Shortly after the June meeting a decision was reached to examine alternatives to provide clean water to the affected residents. A FS was conducted and the EE/CA report based upon the FS was made available for public comment from May 28 to June 11, 1987. A public meeting was held and oral comments were received on the proposed alternatives in Smithfield, RI on June 10, 1987. The written and oral comments received during the 21 day comment period are summarized in a Responsiveness Summary contained in the Administrative Record.

The FS for cleanup of the site itself was released to the public for review and comment on July 7, 1987. Consistent with Section 117 of CERCLA, EPA published a preferred remedial action document on July 14, 1987 describing the alternatives analyzed in the Feasibility Study and EPA's preferred alternative for site remediation. EPA held a public comment period on the draft FS and preferred alternative from July 22, 1987 to August 17, 1987. A public imformational meeting was held on the draft FS and preferred alternative on July 21, 1987 and oral comments were taken during a public meeting on August 6, 1987. Oral comments were recorded in a transcript which is part of the Administrative Record for the site and are summarized in the Responsiveness Summary, also in the Administrative Record.

In general, those commentors that submitted formal written or oral comments supported EPA's preferred alternative for the site. However, most commentors were concerned about the safety of emissions from the incineration process and the excavation of contaminated soils. Commentors' were also interested on how EPA would monitor air emissions from the site during remediation to ensure the safety of local residents. The Smithfield Town Council, RIDEM and the Rhode Island Sierra Club supported EPA's remedy but wanted to have significant input into the design and the operational aspects of the remedy.

Community relations activities conducted at the site to date have included:

- At a Town Council meeting in October 1984, EPA announced it had agreed with RIDEM that EPA would assume the lead for cleanup activites at the site.
- EPA conducted community interviews as part of the community relations plan in June 1986.
- EPA mailed information updates, fact sheets, and press releases to the site community in July 1985, August 1985, September 1985, February 1986, June 1986, December 1986, January 1987, and May 1987.
- EPA held a public meeting to discuss the results of the remedial investigation in June 1986.
- EPA held a public meeting and conducted a comment period on a proposed Expedited Response Action (waterline) to serve residents affected by the site in June 1987.
- EPA held a public information meeting on the draft FS and preferred alternative on July 21, 1987.
- EPA held a public meeting to receive oral comments on the draft FS and the preferred alternative on August 6, 1987.
- EPA conducted a public comment period on the draft FS and preferred alternative from July 22, 1987 to August 17, 1987.

V Evaluation of Alternatives

A. Introduction

On October 17, 1987, the President signed into law the Superfund Amendments and Reauthorization Act of 1986 (SARA) amending the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Prior to October 17, 1986, actions taken in response to releases of hazardous substanced were conducted in accordance with the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, dated November 20, 1985. Generally, the purpose of the NCP is to effectuate the response powers and responsibilities created by CERCLA. In accordance with Section 105 of CERCLA as amended by SARA, the current NCP is being revised to reflect the additional provisions of SARA. In the interim, prior to the revision of the NCP, the procedures and standards for responding to releases of hazardous substances, pollutants, and contaminants shall be in accordance with Section 121 of SARA and, to the maximum extent practicable, the current NCP.

SARA retains the original CERCLA mandate for protective and cost-effective remedial actions. According to Section 300.68(a)(1) of the NCP, remedial actions are those responses to releases that are consistent with a permanent remedy to prevent or minimize the release of hazardous substances or pollutants or contaminants so that they do not migrate to cause substantial present or future danger to public health or welfare or the environment. SARA adds a new statutory emphasis on risk reduction through destruction or treatment of hazardous waste rather than protection achieved through prevention of exposure. Section 121 of SARA also establishes a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes over remedies that do not achieve such results through treatment. Furthermore, SARA requires that EPA select a remedy that is protective of human health and environment, that is cost-effective and that utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable.

In accordance with SARA and the NCP, the primary remedial response objectives for Superfund remedial actions are:

- prevent or mitigate further releases of contaminants to surrounding environmental media;
- eliminate or minimize the threat posed to public health or welfare or the environment;
- reduce the volume, toxicity or mobility of hazardous wastes through the use of treatment technologies; and
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Section 300.68 of the NCP, in conjunction with the EPA guidance document entitled "Guidance on Feasibility Studies Under CERCLA," also sets forth the remedial alternative development and remedy selection process. This process consists of seven steps:

(1) Identify the nature and extent of contamination and threat presented by the release (§ 300.68(e)(2));

(2) Identify general response actions that may be needed to remedy the release;

(3) Identify and screen remedial technologies potentially applicable to wastes and site conditions;

(4) Develop alternatives to achieve site specific response objectives (§ 300.68 (f));

(5) Initial screening of alternatives (§ 300.68 (g));

(6) Detailed analysis of alternatives (§ 300.68 (h)); and

(7) Selection of remedy (§ 300.68 (i)).

Both SARA and the NCP require first the identification of the nature and extent of contamination at the site. Beyond the initial site characterization SARA retains the basic framework for the remedial alternatives development and remedy selection process enacted through the NCP, but each phase is modified to reflect the provisions of SARA.

The nature and extent of contamination and the threat presented by the release at the Davis site was documented in the Remedial Investigation for the site and presented as part of the discussion on Site History. A discussion of how SARA affects each particular phase of the remedy selection process follows.

B. Response Objectives

Consistent with the NCP, remedial response objectives for the site were developed for source control measures, which address source areas of contamination, and management of migration measures, which address media or areas that have been impacted by the migration of contaminants away from the source area. The Remedial Investigation (RI) identifies the Northern disposal pit, the Southern Disposal Pit, the Bunker Oil Impoundment, the Ridge Line Area, and contaminated soils excavated from these areas and spread on the site as the sources of contamination at the site.

1. Source Control Objectives

The remedial response objectives for source control measures are to:

- prevent or mitigate the continued release of hazardous substances, pollutants and contaminants to groundwater aquifers and surface water bodies.
- reduce risks to human health associated with direct contact with contaminants in surface and sub-surface soils and sediments.
- reduce the volume, toxicity or mobility of hazardous substances, pollutants and contaminants.

The first objective, preventing or mitigating further release of contaminants to surrounding environmental media, entails addressing the two principal migration pathways identified at the site. First, contaminants have been transported through the highly permeable soils via downward migration of the groundwater into the overburden and bedrock aquifers. These contaminants originate from the excavated soils of the Southern Disposal Pit and from the liquid chemical wastes dumped directly into the unlined Northern disposal pit. Contaminants have also been transported via surface water runoff from the contaminated Northern Disposal Pit, into an adjacent drainage trench, and then into the waters of Latham Brook.

The second objective of reducing risks to human health associated with the ingestion, direct contact and inhalation of contaminants in surface and subsurface soils entails remediation of soils or reduction of exposure associated with the contaminated onsite soil areas. Raw waste and source soil areas will be remediated based on reducing risk to acceptable levels.

The third objective, reduction of volume, toxicity or mobility of hazardous substances will require treatment of raw wastes on site; and contaminated source soil areas, groundwater and surface water.

There are three general types of source control measures which can be utilized to reduce human health and environmental risks associated with contaminated releases from the source areas, i.e., release to groundwater and surface water. Actions may be taken to (1) either contain or isolate wastes on-site to eliminate the exposure pathways, (2) treat wastes on-site, thereby reducing contaminant levels present or (3) physically remove the wastes for off-site treatment or disposal. These measures will effect the levels by reducing the amount of contamination migrating from the site.

According to the National Contingency Plan (NCP), all applicable or relevant and appropriate federal public health and environmental requirements must be identified and "...EPA believes that those requirements must be met in order to achieve an effective CERCLA remedy." (Federal Register Vol. 50, No. 224, November 20, 1985), 40 CFR Part 300. When evaluating measures to isolate the source areas, the requirements of RCRA (Resource Conservation and Recovery Act), and TSCA (Toxic Substances Control Act), SDWA (Safe Drinking Water Act), and CAA (Clean Air Act) among others will be used to ensure protection of the public health, welfare and the environment. These laws address not only eliminating direct contact with source material but also potential releases, i.e., to groundwater or surface water from source material.

In order to evaluate the remaining two types of source control measures, i.e., reducing contaminant levels via treatment onsite or removing source areas for treatment, target levels must be defined for contaminant levels in the soil. Currently there are no federal requirements which contain standards or target levels which apply to soils. Therefore, when considering treatment or removal of waste and soil source areas, a combination of risk analysis and an engineering-based cost effectiveness will be used to develop target levels which will be protective of the public health, welfare, and the environment.

2. Management of Migration Objectives

The remedial response objectives for managment of migration measures include:

- preventing or mitigating migration of contaminants beyond their current extent; and
- eliminating or minimizing the threat posed to the public health, welfare, and the environment from the current extent of contaminant migration.

The first objective, preventing and mitigating migration of contaminants beyond their current extent, requires addressing the migration of contaminants in groundwater and the effects this migration has on the uses of the groundwater aquifers. These pathways of contaminant migration include groundwater flow through the overburden and bedrock aquifer via percolation of contaminants from the disposal pits, and migration of contaminants via surface water flow originating from groundwater baseflow and discharging to the drainage stream that runs through the site. The second objective, eliminating or minimizing the threat posed to the public health, welfare, and the environment from the current extent of contaminant migration, entails addressing the exposure pathways, receptor populations, and levels of exposure associated with contaminated groundwater and surface water. The Remedial Investigation indicates that the most important exposure pathways for off-site receptors are likely to be the movement of site contaminants through groundwater to private wells off-site. The baseline risk assessment evaluated the risks associated with dermal contact, inhalation and ingestion of contaminated groundwater. The evaluation concluded that these pathways would contribute to the overall unacceptable risk associated with the use of the groundwater as a water supply.

There are three general types of management of migration measures which can be taken to reduce human health and environmental risks associated with the currently contaminated groundwater. These measures include:

1) restricting the use of groundwater including provisions of an alternate water supply; or isolating the groundwater to eliminate the exposure pathway;

2) reducing contaminant levels in the groundwater via treatment; or

3) removing the groundwater (for treatment or disposal elsewhere).

Target levels for remediating groundwater are specified in applicable or relevant and appropriate federal and state public health laws and regulations. These include tne Safe Drinking Water Act maximum contaminant levels (MCLs), RCRA Subpart F corrective action requirements, and state standards and requirements. In addition, the EPA Office of Drinking Water Health Advisories, and Clean Water Act (CWA) Ambient Water will be considered.

The target level of treatment for contaminated groundwater will depend upon the point of use and the discharge point to surface waters of any treated groundwater. For point of use treatment, the Safe Drinking Water Act MCLs will be considered as applicable. For discharge of groundwater to surface waters, the Clean Water Act's, National Pollutant Discharge Elimination System (NPDES) effluent requirements and Water Quality Criteria will be applicable or relevant and appropriate. For discharge of contaminated groundwater to a publicly owned wastewater treatment plant (POTW), pretreatment requirements under the CWA and the quality of the final POTW effluent will have to be considered.

C. Technology Development and Screening

The "Guidance on Feasibility Studies Under CERCLA" dated June 1985 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. The screening process consists of seven steps previously mentioned in the Introduction to Section V Evaluation of Alternatives. Data for step one of the process (nature and extent of contamination) are provided by the RI. The threat presented by that contamination is evaluated in Section 8.0 of the RI, Baseline Risk Assessment.

Steps 2 through 7 of the process are carried out in the FS independently for source control and management of migration responses. The preferred alternative selected for the site consists of both a source control alternative and management of migration alternative.

General response actions, identified as response categories within the FS, are based on the results of the field investigation and the findings of the RI. Technology screening considers the waste-limiting (waste characteristics that limit the effectiveness or feasibility of a technology) and site-limiting (site characteristi such as soil permeability that preclude the use of a technology) factors unique to the site, and the level of technical development for each technology.

Tables 1 and 2 summarize the general response categories and the applicable technology screening for source control and management of migration. Technologies which emerged from this screening process were combined into source control and management of migration alternatives.

TABLE 1

REMEDIAL TECHNOLOGIES APPLICABLE FOR SOURCE CONTROL

(1) NO ACTION

- Site security

(2) CONTAINMENT

- Capping
  - Multi-layered systems
  - Surficial stabilization

(3) IN-SITU TREATMENT

- Aeration
- Solvent extraction
- Soil flushing
- Aerobic biodegradation
- Anaerobic digestion
- Oxidation
- Neutralization
- In-situ heating
- Vitrification

(4) ON-SITE STORAGE

- Waste pile
- Storage vault
- Storage bins
- Storage bags
- Tank/drum storage

TABLE 1 (CON'T)

(5) ON-SITE TREATMENT

- Cement and silicate based fixation/grouting
- Thermoplastic fixation
- Surface macroencapsulation
- Absorbents
- Vitrification
- Filtration
  - Pressure filtration
- Classifiers
  - Screens and sieves
  - Classifiers
- Carbon Adsorption
  - Powdered activated carbon addition
- Evaporation
- Solvent extraction
- Mechanical aeration
- Anaerobic digestion
- Composting
- Oxidation
- Reduction
- Neutralization
- Rotary kiln
- Multiple hearth incineration
- Infrared incineration

TABLE 1 (CON'T)

(6) ON-SITE DISPOSAL

RCRA landfill

(7) OFF-SITE TREATMENT

RCRA hazardous waste TSD (Treatment/Storage/Disposal) facility

(8) OFF-SITE DISPOSAL

RCRA landfill

TABLE 2

REMEDIAL TECHNOLOGIES APPLICABLE FOR MANAGEMENT OF MIGRATION

NO ACTION

- Monitoring

CONTAINMENT

- Slurry walls
- Grout walls
- Sheet piling
- Block displacement
- Bottom seal grouting

DIVERSION

- Slurry Walls
- Grout Walls
- Sheet Piling
- Groundwater Interceptor Trench

OFF-SITE DISPOSAL

- NPDES discharge
  - Sewer line
  - Surface water
- Deep well injection

ON-SITE STORAGE

- Tank/drum storage
- Surface impoundment

ON-SITE TREATMENT

- Precipitation/coagulation, flocculation
- Sedimentation/clarificatio
  - Gravity thickening
- Filtration
- Carbon adsorption
  - Vapor and liquid phase contactors
- Powered activated carbon addition

ONSITE DISPOSAL

- NPDES discharge
  - Sewer line
  - Surface water
- Spray application
- Seepage basins and ditches

D. Development and Screening of Remedial Action Alternatives

Technologies which emerged from the technical screening were combined into 8 source control alternatives and 11 management of migration alternatives. These alternatives include one or more primary technologies, and several supporting technologies.

Section 300.68(f)(1) of the NCP requires that, to the extent that it is both possible and appropriate, at least one remedial alternative shall be developed as part of the Feasibility Study in each of the following categories:

- Alternatives for treatment or disposal at an off-site facility as appropriate.

- Alternatives that attain applicable or relevant and appropriate federal public health and environmental requirements.

- As appropriate, alternatives that exceed applicable or relevant and appropriate federal public health and environmental requirements.

- As appropriate, alternatives that do not attain applicable or relevant and appropriate federal public health and environmental requirements but will reduce the likelihood of present or future threats from hazardous substances and that provide significant protection to public health and welfare and the environment. This must include an alternative that closely approaches the level of protection provided by alternatives that attain applicable or relevant and appropriate requirements.

- No action alternative.

This screening of alternatives must also comply with SARA. Section 121(d) of SARA basically codifies EPA's CERCLA Compliance Policy. First published as an appendix to the preamble of the NCP, this policy requires that Superfund remedial actions attain applicable or relevant and appropriate requirements (ARARS) of other federal statutes. While Section 300.68(f) of the NCP specifically refers to ARARs in regard to the Development of Alternatives, SARA incorporates this requirement into statutory law, while adding the provision that remedial actions also attain State requirements more stringent than federal requirements if they are also applicable or relevant and appropriate and identified to EPA in a timely manner. The new statutory requirements and preference for treatment that reduces the volume, toxicity or mobility of hazardous waste, further modifies the process by which remedial alternatives are developed.

In accordance with SARA and the NCP, treatment alternatives were developed for the site ranging from an alternative that, to the degree possible, would eliminate the need for long-term management (including monitoring) at the site to alternatives involving treatment that would reduce the volume, toxicity or mobility of the hazardous substances as their principal element. In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no action alternative were developed.

Alternatives developed and considered for initial screening at the Davis Liquid Waste site are:

1. Source Control Alternatives

No Action
SC (Source Control)-1: No Action (with fencing)
On-site Treatment

SC-2: Low Temperature Thermal Treatment

SC-3: Soil Washing

SC-4: Thermal Destruction

SC-5: Composting

On-site Containment

SC-6: RCRA Landfilling Off-site Containment

SC-7: RCRA Landfilling Off-site Treatment

SC-8: Thermal Destruction

2. Management of Migration Alternatives

Groundwater

MOM-GW 1	No action (with monitoring)
MOM-GW 2	On-site treatment, air stripping, carbon adsorption
MOM-GW 3	Off-site treatment
MOM-AWS	Alternate water supply

Surface Water

MOM-SW 1	No action (with monitoring)
MOM-SW 2	On-site treatment with groundwater

Sediments

MOM-SD 1	No action (with monitoring)
MOM-SD 2	Containment, capping
MOM-SD 3	On-site treatment; treatment with source soils

The purpose of the initial screening step is to reduce the number of alternatives for further detailed analysis while preserving a range of options. The range of alternatives developed for source control and management of migration were subject to an initial screening using the criteria listed in §300.68(g)(1), (2) and (3) of the NCP. Consistent with Section 121(b)(2) of SARA, innovative technologies may be carried through the screening process if there is reasonable belief that they offer the potential for better treatment performance or implementability, or less adverse environmental impacts than other available technologies or lower costs than demonstrated technologies. The results of the initial screening process are described in detail in Section 3 of the FS. The initial screening process eliminated the following alternatives for the reason(s) stated:

Source Control

SC-3 Soil Washing

- § 300.68 (g)(2): The alternative is not a reliable means for addressing the problem because of the location and conditions at the site.

SC-5 Composting

- § 300.68 (g)(2): The alternative is not a reliable means for addressing the problem because of the location and conditions at the site.

SC-6 RCRA Landfilling onsite

- § 300.68(g)(3) and SARA § 121(b): The alternative of using a RCRA landfill on-site as the exclusive source control remedy would not meet the preference for treatment criteria specified in § 121(b) of SARA.

SC-7 RCRA Landfilling at an off site permitted facility

- § 300.68(g)(1): The cost of this alternative is estimated to be greater than on-site landfilling due to the limited availability of landfill space at off-site facilities. Also it does not offer greater public health protection than landfilling on-site. In addition, this alternative is not appropriate when considering the factor of long-term uncertainties associated with land disposal as specified by §121(b) of SARA.

Management of Migration

Groundwater

MOM-GW2B Carbon adsorption treatment

- § 300.68(g)(1): This alternative will be more costly than a combination of treatments which would achieve the same result.

MOM-GW2D Air stripping/Biodegradation/Carbon adsorption

- § 300.68(g)(2): This alternative is not as reliable as other treatment combinations for addressing the problem.

MOM-GW3 Off-site treatment of groundwater

- § 300.68(g)(1)(3): This alternative is estimated to be more costly than other alternatives and also less reliable and effective due to the problems associated with its implementability.

Sediments

MOM-SD2 Capping of sediments

- § 300.68(g)(2): This alternative does not represent an applicable or reliable solution to the problem.

A summary of the alternative screening for source control and management of migration alternatives is shown in Tables 3 and 4, respectively.

Consistent with the NCP, a no action alternative for both source control and management of migration is carried into the detailed analysis to provide a basis for comparison to the other alternatives.

E. Detailed Analysis of Alternatives

The initial screening of alternatives performed pursuant to § 300.68(g) of the NCP and the factors of Section 121(b) of SARA leaves four remaining source control alternatives and seven remaining management of migration alternatives to be examined under the Detailed Analysis of Alternatives.

The remaining alternatives were analyzed using the criteria specified in Section 121(b)(1) of SARA and, where appropriate, § 300.68(h) of the NCP.

The evaluation criteria cited in Section 121(b)(1) (A-g) of SARA are:

(A) the long-term uncertainties associated with land disposal;

(B) the goals, objectives and requirements of the Solid Waste Disposal Act;

(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;

(D) short and long-term potential for adverse health effects from human exposure;

(E) long-term maintenance costs;

(F) The potential for future remedial action costs if the alternative remedial action in question were to fail; and

(G) the potential threat to human health and the environment associated with excavation, transportation, and re-disposal or containment.

For alternatives where treatment is the principal component of the alternative, all of the Section 121(b)(1) factors are relevant since it is expected that treatment residuals may exhibit the characteristics of hazardous waste and will be landfilled either on-site or off-site in a RCRA Subtitle C landfill.

Furthermore, by considering as factors, Section 121(b)(1)(A) and (C) inherently the Agency incorporates Section 121(b)(1)(B); the goals, objectives and requirements of the Solid Waste Disposal Act.

The potential for future remedial action costs, if the alternative remedial action in question were to fail, (Section 121 (b)(1)(G) is an important evaluation factor for alternatives that require long-term maintenance and monitoring. This factor was used when evaluating land disposal alternatives. The inability of a treatment technology to obtain its performance goals (i.e. fail) would probably result in selection of a different remedial action or a change in performance goals, hence the potential costs associated with failure and treatment technology were not evaluated for each such alternative. Potential failure of a technolgy may, more appropriately be evaluated in the event that the remedy is innovative and has not been proven on a full-scale level or similar situations. The treatment alternatives for the Davis site have had application at other Superfund sites and industrial applications for similar contaminants.

The evaluation criteria cited in 40 CRF § 300.68 (h) of the NCP are:

1) Detailed cost estimation including, operation and maintenance costs, and distribution of costs over time;

2) Evaluation in terms of engineering implementation reliability, and constructability;

3) An assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of, public health, welfare or the environment. This includes an evaluation of the extent to which the alternative attains or exceeds applicable or relevant and appropriate Federal public health and environmental requirements. Where the analysis determined that public health and environmental requirements are not applicable or relevant and appropriate, the analysis evaluates the risks of the various exposure levels projected or remaining after implementation of the alternative under consideration;

4) An analysis of whether recycle/reuse, waste minimization, waste biodegradation, destruction, or other advanced, innovative, or alternative technologies is appropriate to reliably minimize present or future threats to public health, welfare or the environment;

5) An analysis of any adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation.

The evaluation approach of assessing the alternatives by the factors mandated in Section 121(b)(1)(A-G) of SARA and the criteria specified in § 300.68 (h) of the NCP is consistent with EPA policy and guidance dated December 24, 1986 entitled "Interim Guidance on Superfund Selection of Remedy" and the July 24, 1987 policy entitled "Additional Interim Guidance for FY '87 Records of Decision." Section 4 of the Feasibility Study provides the detailed documentation for the Detailed Analysis of Alternatives.

1. The No Action Alternative

The explanation of the no action alternatives for source control, groundwater, surface water, sediments and the alternate water supply system are presented together so that the reader may understand the impacts of a "total no action scenario" for the site. The effectiveness of some of the no action alternatives, for off-site surface water and off-site sediments, can be greatly improved when combined with source control and management of migration alternatives.

SC-1 Source Control No Action

The source control no action alternative for the Davis Site is limited to fencing contaminated on-site waste and source soil areas, seeding areas to control dust and long-term multi-media monitoring. No treatment of the source soil areas is included with this response alternative. Therefore, the environmental fate and removal of contaminants found at the site are dependent on the dynamics of the natural attenuation and contaminant transport mechanisms. The degradation mechanisms which are relevant to the Davis Site are volatilization of organic to the atmosphere and leaching of organics to the groundwater. The calculations for the fate of degradation, including the assumptions used that were based on test data reported in the RI, are included in the Appendix of the FS.

The total mass of organic contaminants within the source soil areas has been estimated as 7,522kg. Beased on calculations, a significant quantity of contamination (5960kg) is available to be leached form the source soil into the groundwater if the No Action alternative is adopted for the site. The estimated half-life for the source soils due to volatilization and leaching is approximately 23 years. The total volatile organic mass dissolved within the aquifer is estimated to be about 355kg; 260kg of the mass is estimated to be in the overburden aquifer with the remaining 95kg contained in the bedrock aquifer. The principal mechanism for the groundwater degradation is due to the volatilization of organics in the overburden aquifer. It is projected that the natural removal of contaminants from the groundwater is sufficient to overcome the input from the source area in approximately 40 years. Assuming the 1970 is the base year for this calculation source would be overcome in the year 2010. It would then take the groundwater an additional 37 years to reach concentration levels that would protect public health in the 10^{-5} to 10^{-6} range.

Considering the natural removal scenario it is estimated that the groundwater beneath the site would reach protective levels in the year 2047.

To allow for the ongoing tire storage business conducted by the Davis family on the site, the no action alternative will include the fencing of the areas known to contain concentrated wastes and heavily contaminated soils. Specifically, these areas are the Northern and Southern Disposal Pits and the Drainage Trench. Fencing these areas would not necessarily eliminate exposure from contaminants to persons working on or near the contaminated areas.

In conjunction with fencing, the Southern Disposal Pit will be filled, graded and seeded. These measures will help to control soil dust and minimize infiltration of contaminants to the groundwater. Since the Western Access Road is used as a truck lane, it is impractical to cover and seed it. Similarly, because the Northern Disposal Pit is excavated so that 4 to 5 feet of standing groundwater is present, it is impractical to seed it. Also, the drainage trench, which had fed the headwaters of Latham Brook, will not be seeded due to standing water present in the trench. In addition, a monitoring program including air, surface water, and groundwater sampling would be executed at the site. This would allow for risks from site contamination to specific receptors to be monitored.

SC - 1, the No Action alternative, does not reduce the toxicity or mobility of contaminants; it is not protective of human health and the environment and is not effective in the short or long term because the degree of risk reduction depends on natural alternation and is not projected to reach protective levels until the year 2047. Furthermore the no action alternative will not attain Federal and State applicable or relevant and appropriate public health and environmental requirements because it does not comply with the Resource Conservation and Recovery Act (RCRA), 40 C.F.R. Part 264, Subparts G (closure and post closure; K (surface impoundments) and N (landfills). The estimated present worth cost of the no action alternative SC-1 is:

Capital Cost		O&M Cost		Total Cost
$203,900	+	$1,361,500	=	$1,565,000

MOM-GW1 No Action Alternative for Groundwater

The no action alternative for groundwater consists of monitoring groundwater at 7 bedrock wells twice each year for at least 30 years and annual sampling of 40 residential private wells that lie in the area affected by the migrating plume of contamination.

Since this alternative does not employ treatment, it is not a permanent solution to the problem and there will be no reduction of the mobility or volume of contaminants in the groundwater migrating off-site. There will be a reduction in toxicity to protective levels in the groundwater due to natural attenuation in approximately 60 years. Therefore, this alternative is not protective of human health and the environment in the short term, and it is very uncertain if it would be in the long term. Furthermore this alternative does not comply with RCRA, 40 C.F.R. Part 264, Subpart F regulations or the requirements of the Safe Drinking Water Act. The present worth cost of this alternative is:

Capital Cost		O&M Cost		Total Cost
$20,100	+	$502,400	=	$522,500

MOM-SW 1 No Action Alternative for Surface Water

The no action alternative for surface water migrating from the site to Latham Brook consists of biannual sampling at two surface water locations for at least 30 years. Samples will be obtained in a tributary stream in close proximity to the site and approximately 0.1 mile downstream in Latham Brook. These samples will be analyzed for metals since little to no organic contamination was observed in Latham Brook during the RI field investigation. Under existing conditions there is very low risk to public health from the contaminants in Latham Brook. The principal threat may be to fresh water aquatic life due to metals in the surface water. The no action alternative coupled with an alternative that would prevent contaminated surface water from entering Latham Brook would reduce this threat significantly.

This alternative is not protective of the environment because present lead and nickel concentrations in the surface water from the site may be harmful to freshwater aquatic life. Also this alternative taken alone is not effective in that it does not mitigate migration of contamination via surface water to Latham Brook and reduce the impact on aquatic organisms. Furthermore, this alternative does not meet the CWA water quality criteria (WQC) requirements for discharges to surface waters.

The present worth cost of this alternative is:

Capital Cost		O&M Cost		Total Cost
$2,000	+	$226,000	=	$228,000

MOM-SD 1 No Action Alternative for Off-site Sediments

The discussion of the off-site sediment alternative focuses on the sediments in Latham Brook downstream of the site. The two highly contaminated on-site sediment areas, the Northern Disposal Pit and the Drainage Trench, are addressed with the source control alternatives.

The no action alternative for off-site sediments is the surface water monitoring program described in the no action alternative for surface water. This is appropriate since sediment contamination is principally caused by contaminants in the water column being deposited or adsorbed on existing Latham Brook sediments. As in surface water, the adverse environmental effects of the contaminated off-site sediments are associated with fresh water aquatic life. It is anticipated that levels of lead and zinc could exceed the CWA Water Quality Criteria for aquatic life if metals in sediments were resuspended, increasing the exposure of organics. Although the no action alternative for sediments could result in levels of lead and zinc in surface water immediately downstream of the site to exceed the WQC, it is expected that it would be protective over the long term if surface water from the site was treated to remove these inorganic contaminants.

There is no cost for this alternative since its impacts will be monitored through the no action surface water monitoring program.

MOM-AWS No-Action Alternative for an Alternate Water Supply System

This alternative consists of the sampling of the 40 residential wells annually and will be performed under the groundwater no action alternative. This alternative is not protective of human health and does not prevent or mitigate exposure to contaminants. Also it does not provide a permanent solution to the problem of contaminants in groundwater migrating offsite, nor does it prevent exposure of receptors to potentially harmful levels of organic contaminants.

There is no cost for this alternative since it would be conducted as part of the no action groundwater monitoring program.

2. Source Control Alternatives

SC-2 On-site Low Temperature Thermal Soil Treatment

This alternative consists of excavation and processing of approximately 25,000 cubic yards of raw wastes and contaminated soils in an on-site low temperature (300 to 500°F) thermal soil treatment system. Pilot studies of similar technology at other heavily contaminated sites have demonstrated greater than 99.99% removal of volatile organic compounds from contaminated soil. Levels of contamination at these sites have been as high as 38,000 ppm of total volatile organic compounds. Pilot testing of this unit on the Davis Site would be required in order to establish the actual operating parameters and expected removals of the organic contaminants found in the soils at the Davis Site. However, other pilot tests have shown this process to be effective in removing these contaminants.

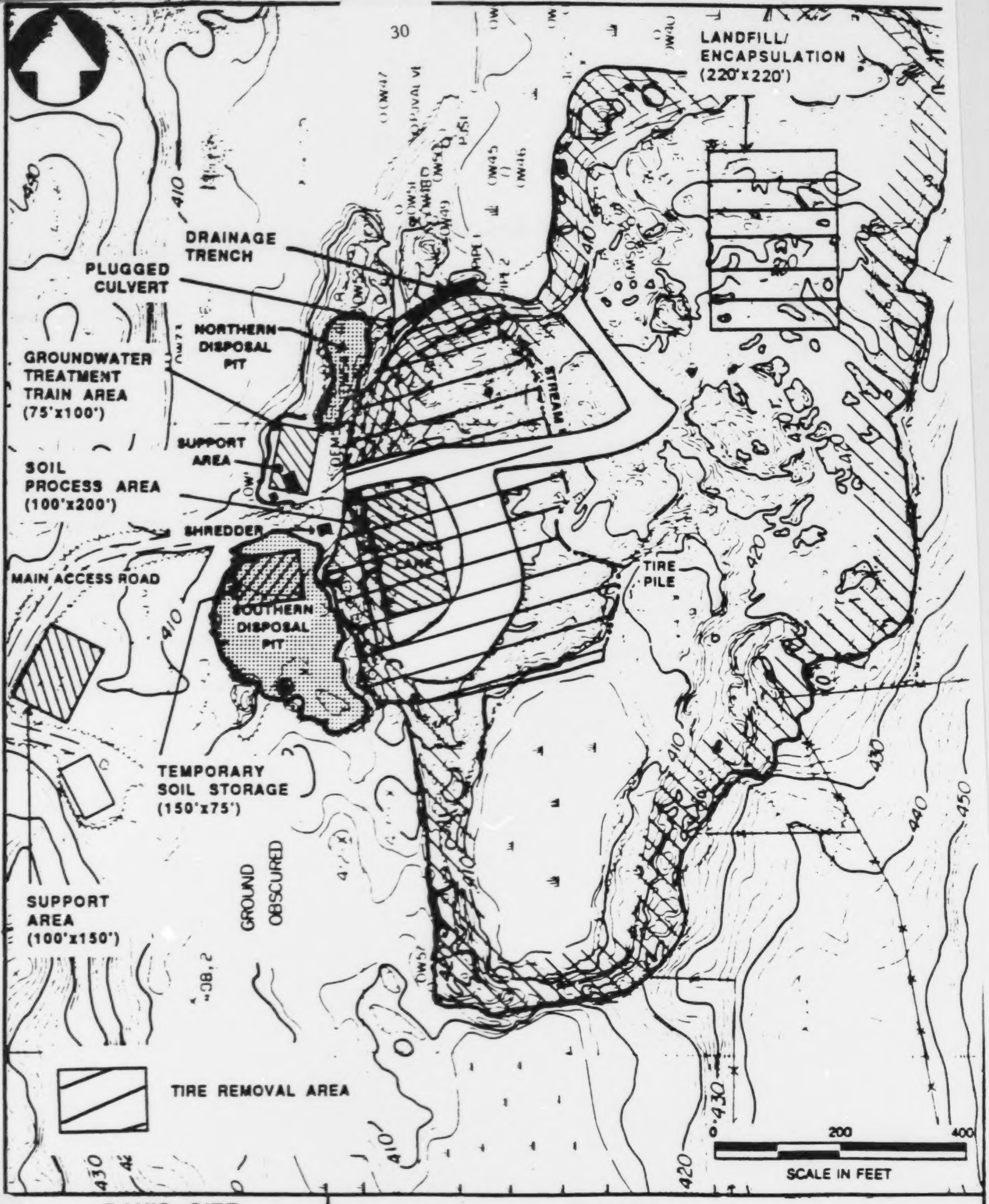
The complete process will include dust control systems materials handling systems, and soil storage hoppers, along with the primary thermal processing equipment and air pollution control equipment.

Before excavation can begin tires must be removed from the area west of the unnamed stream (see Figure 4). This 115,000 square foot area will be evaluated to determine its suitability for the siting of the operations area. The area will be regraded and the treatment facility will be placed east of the groundwater treatment facility and the Southern Disposal Pit, where most of the contaminated soils will be removed.

The excavation and movement of contaminated soils at the site will be performed by a backhoe and a front end loader. To avoid contaminated soil piles being exposed to wind erosion and rainfall, only the amount of soil that can be processed during the work day will be excavated. The thermal treatment system, operating, at full scale, can process approximately 10,000 pounds of contaminated soil per hour. Assuming a density of 110 pounds per cubic foot (lbs/ft^3), the process will treat 27 cubic yards (yd^3) during an 8 hour work day. It is estimated that this process would take approximately three years to treat the contaminated soils at the site to protective levels.

Excavated soils will be segregated into three categories: 1) raw waste materials; 2) source soils; and 3) associated soils. Raw waste materials include drums, bottles, cans, and other containerized wastes. Under this alternative raw waste materials will be removed from the site by truck and transported to an off-site RCRA incineration facility. The soils which come in direct contact with the waste materials are referred to as source soils. The third category of soils are the associated soils which have been contaminated by contact with either rainfall or surface water that has infiltrated through the raw waste. The low temperature thermal stripping process would remove the total volatile organics, but not the heavy metal contamination. Thermally processed waste and soils will be monitored for their metals content. Those with metal concentration in excess of the EP toxicity limits specified in 40 CFR § 261.24 will be stabilized and and placed in an onsite RCRA Subtitle C landfill. The treated soils with metal concentrations that do not exceed the EP toxicity limits will be used to backfill the excavated areas. Upon completion of filling the excavated areas the areas will be graded, loamed and seeded.

The soils will be fed to a materials dryer, where heat is applied to the soils. Induced air flow passing through the heated soils will transfer the volatile and semi-volatile organic compounds from the soil matrix to the hot gases which are then routed to an afterburner for complete combustion. The soils will have a residence time of 30 to 60 minutes in the dryer. The exhausted gas stream will pass through an afterburner having a temperature of 805°C; a scrubber for removal of acid gases and a or baghouse for removal of particulates before being discharged to the atmosphere through an exhaust stack. Preliminary design criteria for a full scale system is included in Table 5.


LANDFILL/
ENCAPSULATION
(220'x220')
DRAINAGE
TRENCH
PLUGGED
CULVERT
NORTHERN
DISPOSAL
PIT
GROUNDWATER
TREATMENT
TRAIN AREA
(75'x100')
SUPPORT
AREA
STREAM
SOIL
PROCESS AREA
(100'x200')
SHREDDER
MAIN ACCESS ROAD
SOUTHERN
DISPOSAL
PIT
TIRE
PILE
TEMPORARY
SOIL STORAGE
(150'x75')
GROUND
OBSCURED
SUPPORT
AREA
(100'x150')
TIRE REMOVAL AREA
30
410
420
430
440
450
0
200
400
SCALE IN FEET

DAVIS SITE
SMITHFIELD, RHODE ISLAND
Camp Dresser & McKee Inc.
April 1987
Source: E.P.A. (E.M.S.L.)

FIGURE 4

PROPOSED KEY SITE FEATURES – ALTERNATE PROCESS/STORAGE AREAS

TABLE 5

Design Criteria for Low Temperature Thermal Stripping

Soil Residence Time	30 to 60 minutes Soil Feed
Rate	10,000 pound per hour
Soil Discharge Temperature	80°C
Air Inlet Temperature	25°C
Oil Heating Temperature	150°C
Air Flow Rate (Induced)	25 cubic feet per minute
Afterburner Temperature	850°C
Afterburner Residence Time	1.0 Second
Removal Efficiency (VOC)	99.99 percent
Discharge Soil Contamination	50 to 100 parts per billion

With a 10,000 pounds per hour (lbs/hr) operating rate, the soil treatment process will take approximately 24 to 30 months to complete.

The target cleanup level of 2 ppm for total volatile organics (removal of all TVOs down to 2 ppm) can be achieved with a one pass system; however, soils that do not achieve target levels may be passed through the system again. After analysis has determined that the treated soils meet the target levels for cleanup, the soils will be used as backfill for excavated areas. As previously stated, the treated soils that exhibit high levels of heavy metals will be landfilled in an on-site RCRA Subtitle C landfill located in the northeast section of the site. The location of the landfill is shown in Figure 4.

The on-site landfill will be designed as an aboveground RCRA Subtitle C landfill and will isolate the treated soils with a double liner and leachate collection system. The landfill design will be in compliance with RCRA Subtitle C landfill requirements and any applicable state regulations.

Ambient air monitoring for selected organic contaminants and particulate emissions will be carried out around the perimeter of the processing site and the stack gases to monitor any off-site air emission impacts.

The treatment system will destroy 99.99% of the organic contaminants found in the soils by reducing them to harmless products of combustion such as carbon, hydrogen and water vapor. This alternative is protective of public health because it will eliminate the potential exposure to receptors by reducing the contaminants in the soils to acceptable risk levels. It will also mitigate the contribution of contamination that the untreated soils make to the groundwater beneath the site. A major disadvantage of this alternative is that it requires the excavation, packaging and transportation to an off-site RCRA incinerator of approximately 2,500 cubic yards of raw waste material for destruction. This increases the risk of potential exposure during handling and transportation. Further, the implementability of this aspect of the alternative is not assured due to the anticipated competition at commercial incinerators for available capacity. In addition this alternative involves the placement of treated waste residuals which is prohibited under RCRA Land Disposal restrictions (LDR) unless certain treatment standards are met. LDR standards have not been promulgated for soil and debris wastes, but when published, the standards may be applicable or relevant and appropriate. Despite the absence of specific treatment standards, the treatment method employed as part of this remedial action satisfies the statutory requirement to, ... substantially diminish the toxicity of the waste or substantially reduce the liklihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized.

Since thermal processing units similar to the unit described in this evaluation have been used successfully at other Superfund sites, this alternative is expected to be fully effective over the period of operation (3 yrs) and readily available to be used for this cleanup.

Any work conducted under this alternative in areas classified as wetlands will be in accordance with:

- U.S. EPA Policy Guidance Memorandum, "Flood plains and Wetlands Assessments for CERCLA Actions"
- Executive Orders 11988 and 11990
- Applicable RI statutes and regulations governing work within wetlands.

This alternative will meet all applicable or relevant and appropriate federal and state regulations while attaining the target cleanup levels for the contaminant soils. It also will meet National Ambient Air Quality Standards set by the Clean Air Act and the corresponding RIDEM Air Pollution Standards, RI Air Pollution control Regulations No. 1,5,7,9,12,17 and 22. Furthermore, this alternative has been evaluated against the statutory factors of SARA §121(b)(1), and as discussed there are some concerns with the long-term uncertainties associated with land disposal and the potential threat to human health and the environment associated with excavation and transportation of waste off-site for treatment.

Capital costs were developed based on the conceptual design presented in the Feasibility Study (FS).

Detailed costs were obtained from previous estimates of similar technology at ongoing cleanups at Superfund sites. The capital costs for processing 25,000 yd^3 of contaminated soil by system component are shown in Table 6.

Administration and engineering costs include the preparation of the final design plans and specifications, coordination with the responsible regulatory agencies, and review of contractor bids. This cost is estimated at 15% of the total construction cost. A 15% contingency is included in the cost estimates to cover unforseen costs incurred during construction.

The annual operating and maintenance costs for processing 25,000 yd^3 of contaminated.soil by this alternative are presented in Table 7. The major cost elements include labor for the operation and maintenance, fuel, electric power, sampling and analysis, rental equipment, and soil handling. Labor costs are based on average labor rates of $40.00 per hour including fringe benefits and supervisory personnel. Operations are assumed to be 12 hours per day, 250 days per year.

The total present worth costs for processing 25,000 yd^3 of contaminated materials are shown below:

Capital Cost		O&M Cost		Total Cost
$12,916,800	+	$3,181,000	=	$16,097,800

TABLE 6

SC-2: LOW TEMPERATURE THERMAL TREATMENT CAPITAL COSTS*

Based on 25,000 cubic yards of soil

Excavation	$ 112,500
Process/Staging Area	530,000
Aeration Unit with Afterburners	1,800,200
Replacement of Soils	112,500
Loam	47,600
*Soils Handling and Storage	395,000
Off-site Disposal (2,500 cy raw materials)	6,200,000
Building	120,000
Monitoring Equipment	50,000
Electrical Installation	200,000
SUBTOTAL	$ 9,567,800
Engineering & Design (15%)	1,435,000
Contingency (15%)	1,435,000
Pilot Studies (5%)	479,000
TOTAL CAPITAL COSTS	$ 12,916,800

* Includes all capital costs associated with the on-site landfill.

TABLE 7

SC-2: LOW TEMPERATURE THERMAL TREATMENT

OPERATION AND MAINTENANCE

	Annual Cost ($/yr)
Equipment	$ 440,000
Labor	495,000
Fuel	530,000
Electricity	20,000
Water	6,000
Wastewater Disposal	75,000
Caustic	75,000
Oversize Debris Removal	6,000
Laboratory	185,000
TOTAL	$1,832,000

Present Worth (2 years operation)

$1,832,000 x 1.736 = $3,181,000

Total Cost

$3,181,000 + $12,916,800 = $16,098,000

SC-4 On-site Thermal Destruction

This alternative consists of many of the same elements as the SC-2 alternative, on-site low temperature thermal soil treatment. For example, the amounts and types of contaminants (25,000 cubic yards of raw waste and contaminated soils) are the same. One major difference is that the 2,500 yards of raw waste are expected to be destroyed on-site by the thermal destruction alternative, rather than being sent off-site for thermal destruction in the low temperature thermal alternative.

For detoxification of the raw waste and contaminated soils at the site, three potentially applicable mobile thermal system technologies are currently available: rotary kiln incineration, infrared processing and circulating fluidized bed incineration. All three technologies have proven on a pilot scale to be effective in destroying the contaminants found in soil at the Davis Site. A detailed explanation of each system is contained in the FS.

As in the low temperature alternative, each of the three thermal destruction technologies will create waste treatment residuals that will require further treatment. These waste residuals are:

- soil and ash residuals containing heavy metals that will be placed in an on-site RCRA Subtitle C landfill;
- scrubber water blowdown from air pollution control devices necessary to control particulates and acid gas emissions. This effluent will be incorporated into ground and surface water treatment onsite, and
- ash and particulates, captured in a bag house filter air pollution control device, which will be placed in an onsite RCRA Subtitle C landfill.

All three technologies with afterburners are capable of meeting the destruction efficiencies specified in 40 CFR Part 264, Subpart O Incinerators (99.99% destruction of organics) and federal and state emission and ambient air standards under carefully controlled operating conditions. The differences in the three systems becomes apparent when applied to the specific site and waste conditions at the Davis Site. Both the infrared and fluidized bed systems depend on uniformity of particle size for their efficiency of operation. Their primary use has been in industrial application where process waste is generally uniform in size and in heat content. At the site there are 25,000 yards of waste and contaminated soils which will vary in type, moisture content, size of particles and heat content. On the other hand, the rotary kiln incinerator is adaptable to a wide range of waste types, heat content and size of waste feed to the cobustion unit. Therefore, it appears that the rotary kiln incinerator would be more reliable and effective in reducing the toxicity of the organic contaminants because of its relative lack of sensitivity to waste feed and changing operational conditions. This alternative is expected to be easily implemented due to the availability of several existing mobile units.

The on-site incineration option meets the goals, objectives and requirements of SARA § 121(b)(1) because it essentially destroys the contaminants of concern with a relatively short time (2 years of operation). There are some disadvantages to this option in that it requires excavation of contaminated soil thus posing a potential threat to human health and the environment and it creates some residuals that will have to be placed in an on-site RCRA landfill thus requiring long-term monitoring and maintenance. With proper operational controls on excavation and placement and treatment of residual wastes to immobilize contaminants before or during placement in the landfill, any adverse impacts associated with this work can be mitigated to meet the intent of SARA § 121(b)(1). It is anticipated that this alternative will meet all federal and state applicable, relevant and appropriate requirements.

The cost analysis for this alternative is based on cost estimates solicited from three companies offering incineration services.

To complete treatment of the contaminated soils to remove total volatile organics is expected to take two years of incinerator operation. Based on vendor estimates, a median value of $300 per cubic yard was used for calculation of incineration costs. This cost was for incineration services only. The costs for excavation, materials handling and site restoration were estimated separately. For this alternative, total capital and operation and maintenance costs for 25,000 yd^3 of soil broken down by components are presented in Tables 8 and 9 and the totals are also shown below:

Capital Cost	O&M Cost	Total Cost
$10,385,600	$4,526,000	$14,912,000

TABLE 8

SC-4 ONSITE INCINERATION CAPITAL COSTS

Based on 25,000 cubic yards of soil

Excavation	$ 112,000
Process/Staging Area	530,000
Aeration Unit With Afterburners	6,125,000
Replacement of Soils	112,000
Loam	47,600
*Soils Handling and Storage	395,000
Building	120,000
Monitoring Equipment	50,000
Electrical Installation	200,000
SUBTOTAL	$ 7,692,600

*Includes all capital costs associated with on-site landfill.

TABLE 9

SC-4: ONSITE INCINERATION

OPERATION AND MAINTENANCE

	Annual Cost ($/yr)
Equipment	$ 615,000
Labor	700,000
Fuel	750,000
Electricity	30,000
Water	12,000
Wastewater Disposal	105,000
Caustic	105,000
Oversize Debris Removal	30,000
Laboratory	260,000
TOTAL	$2,607,000

Present Worth (2 years operation)

$2,607,000 x 1,736 = $4,526,000

Total Cost

$4,526,000 + $10,385,600 = $14,912,000

SC-8 Off-site Thermal Destruction

This alternative proposes using available off-site commercial incineration facilities to treat all of the raw waste and contaminated soils at the site. Similar to the on-site high temperature alternative, this alternative uses the controlled combustion of organic wastes under high temperature conditions to destroy or detoxify the wastes. Incineration will be conducted off-site at a commercial facility that is capable of accepting soil with high levels of volatile and extractable organics and contaminated with metals. The requirements of this alternative include soil excavation, soil dewatering, containerization, and transportation of the excavated materials offsite. Final restoration of the site will be achieved through application of site-specific filling and grading methods in compliance with the EPA's policy guidance memorandum "Flood Plains and Wetlands Assessments for CERCLA Actions" and applicable or relevant and appropriate RIDEM wetlands requirements.

Soil characteristics will be determined to ensure appropriate methods of handling and transportation. All methods utilized will be in full compliance with the state and federal requirements. Excavated materials will be placed in containers to be labeled and packaged, and reported in compliance with the RCRA regulations described in 40 CFR Parts 261, 262 and 263. All vehicles used for transportation will be appropriately placarded in accordance with the Department of Transportation (DOT) regulations governing the transportation of hazardous materials and will be carefully loaded, secured, and decontaminated before leaving the site to insure that residual contaminaton is not transferred from the site to off-site receptors.

The selection of a commercial incineration facility is dependent on the available capacity at the time of the site remediation and the requirement that the facility be in compliance with all EPA and State environmental laws and regulations controlling its operation.

This alternative meets the requirements of SARA § 121(b)(1) because it will remove all the waste and contaminated soils and essentially destroy the contaminants. Therefore it will be very effective in reducing risk to levels that are protective of public health. This type of operation is also very reliable and is carried out frequently as a means of handling hazardous waste disposal. An added public health safety factor is that commercial incineration facilities are closely monitored by federal and State agencies to insure that they meet all applicable operational and emission requirements.

The major obstacle in utilizing off-site commercial incineration is the difficulty in obtaining a facility which will accept the entire quantity of contaminated waste and soil (25,000 yd^3). Most incineration facilities will only accept small quantities at one time, and therefore large volumes would require storage on-site and a phased delivery schedule extending over at least one year.

Also when this alternative is evaluated with respect to SARA § 121(b)(1)(G) it is apparent that there are also potential adverse public/health and environmental effects due to potential exposure of receptors because of

- accidental spills or releases during off-site transportation, and
- potential releases from contaminated soils and waste stored on-site for long periods of time while awaiting incineration at an off-site facility.

However, the completion of this alternative would eliminate a source of exposure to persons near or on-site and eliminate a source of groundwater contamination. Therefore it will be protective of public health and the environment.

Capital costs for the offsite incineration alternative include the following:

- Excavation and storage of the waste and soil at the site that is to be transported to an off-site incinerator.
- Handling and transportation costs based on unit costs provided by the waste management companies which operate commercial incinerators.
- Backfilling with clean fill, regrading, loam, and seeding of the site after excavation.
- The costs for the sampling and testing programs based on $250 for each regular analysis conducted for incineration, and $2,500 for the additional tests required.

The capital costs for off-site incineration of the 25,000 yd^3 of soils are itemized in Table 10.

The annual operation and maintenance costs for this alternative are presented in Table 11. The cost elements for this alternative include labor for operation and maintenance of the site and rental equipment for upkeep of the remediated site. Labor costs are based on $40/work-hour. The total present worth costs of this alternative are shown below:

Capital Cost		O&M Cost		Total Cost
$75,568,500	+	$917,400	=	$76,486,000

when this alternative is assessed taking into account the NCP requirements regarding cost, it is apparent that that this alternative does not provide substantially greater protection of public health and the environment while requiring a much greater cost than any of the other incineration/thermal treatment alternatives.

3. The Management of Migration Alternatives

MOM-GW 2A & C On-site Treatment of Groundwater

This remedial alternative consists of pumping contaminated groundwater from the overburden and bedrock aquifers; treating it on-site using physical/chemical treatment for removal of oils, sludges and dissolved metals; clarification air stripping for removal of volatile organics, mix-media filtration for removal of suspended solids and carbon adsorption for final removal of refractory organic contamination. After passing through the treatment system the treated ground water will be recirculated to the soils to flush residual contamination from the soils to the treatment system. Contaminated surface water originating on-site will be captured and treated in the system also.

Each of the unit processes has a waste treatment residue that must be treated to the maximum extent practicable and disposed of either on-site or off-site at a permitted hazardous waste facility.

TABLE 10

SC-8 OFFSITE INCINERATION CAPITAL COSTS
BASED ON 25,000 CUBIC YARDS OF SOIL

Operations Area		$ 530,000
Excavation		112,500
Fiber Drums		3,750,000
Transportation and Handling		11,250,000
Waste Incineration		45,000,000
Sampling and Analysis		2,031,000
Backfill		300,000
	SUBTOTAL	$62,973,500
Administration (5%)		3,149,000
Contingency (15%)		9,446,000
	TOTAL	$75,568,500

Use $120/container and 1.5 tons/c.y.

TABLE 11

SC-8 RCRA INCINERATION
OPERATION AND MAINTENANCE

Item	Subtotal
Labor	$ 7,200
Sampling Equipment	1,500
Shipping	1,100
Analysis	84,320
Fence Maintenance	3,200
Total Annual Cost	$97,320

30 YEAR PRESENT WORTH (10%) 97,320 x 9.427 = $917,400

TOTAL COSTS

$75,568,500 + $917,400 = $76,486,000

Figure 5 depicts a generalized flow chart for the treatment process. Figures 6 and 7 present the specific technologies incorporated for each treatment scheme, MOM-GW2A and MOM-GW2C, respectively. The difference between these two schemes is that MOM-GW2A treats liquid organic contamination with two air strippers, whereas MOM-GW2C utilizes one air stripper and two carbon adsorption columns. Otherwise the two schemes are identical.

The contaminated overburden aquifer at the site is estimated to be 540,000 square feet in area and heavily contaminated with volatile organics (200 ppb to 91,000 ppb). The highest concentrations were found in and around the Northern and Southern Disposal Pits. Pumping to extract contaminated groundwater from the overburden aquifer is anticipated to be about 40 gpm. The contaminated ground water will pass through the treatment system and be reintroduced to the overburden aquifer via a flushing distribution system. As explained in the section entitled Performance Goals of the Source Control and the Ground and Surface Water, it is estimated that this system will operate for approximately five to ten years before the target clean up goal for overburden groundwater is achieved.

Pumping from the bedrock aquifer below the Northern and Southern Disposal Pits will occur after the overburden clean up targets are reached and will take place in the later years of remediation.

The construction of the groundwater extraction, treatment, and flush system is dependent on the source control alternative chosen to remove waste and contaminated soil as a source of groundwater contamination. Therefore, construction of the system could not begin until the Northern and Southern disposal pits have been excavated and the placement of clean or treated soil has started in these areas.

The groundwater treatment schemes for this alternative are described in detail in the Feasibility Study, Section 4.7. The design flow is 40 gpm based upon an average overall overburden and bedrock extraction rate of 40 gpm. The treatment facility flow rate is projected to range between 50 gpm and 100 gpm. It will operate continuously for the projected five to ten year period. During the first one to two years only the overburden aquifer will be pumped and treated. During that period, the residual treatment capacity available will be used for on-site contaminated surface water treatment and treatment of contaminated water associated with source control measures such as air pollution control scrubber blowdown.

The two treatment systems evaluated are very similar. The only difference is that one system calls for air stripping alone for water treatment, while the second system calls for air stripping with carbon adsorption as an effluent polishing process. Both

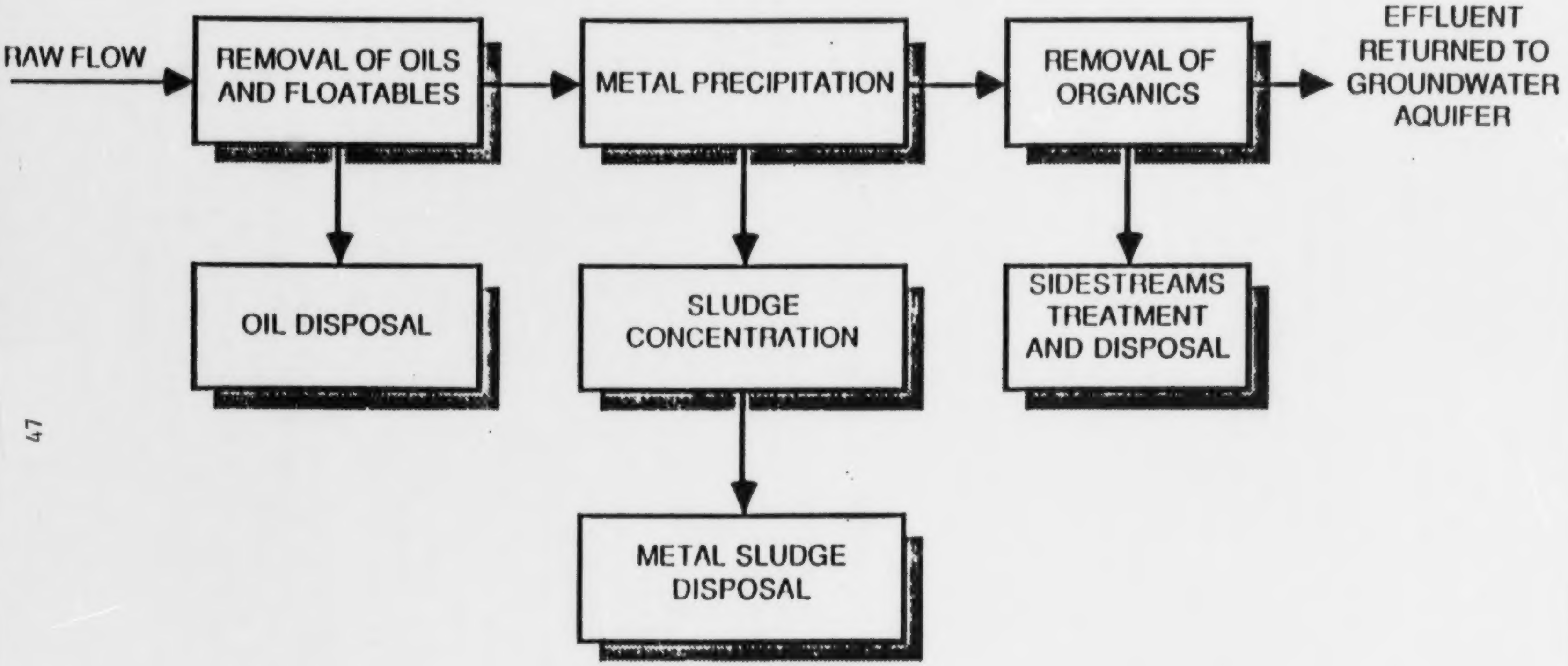

RAW FLOW
REMOVAL OF OILS AND FLOATABLES
METAL PRECIPITATION
REMOVAL OF ORGANICS
EFFLUENT RETURNED TO GROUNDWATER AQUIFER
OIL DISPOSAL
SLUDGE CONCENTRATION
SIDESTREAMS TREATMENT AND DISPOSAL
METAL SLUDGE DISPOSAL

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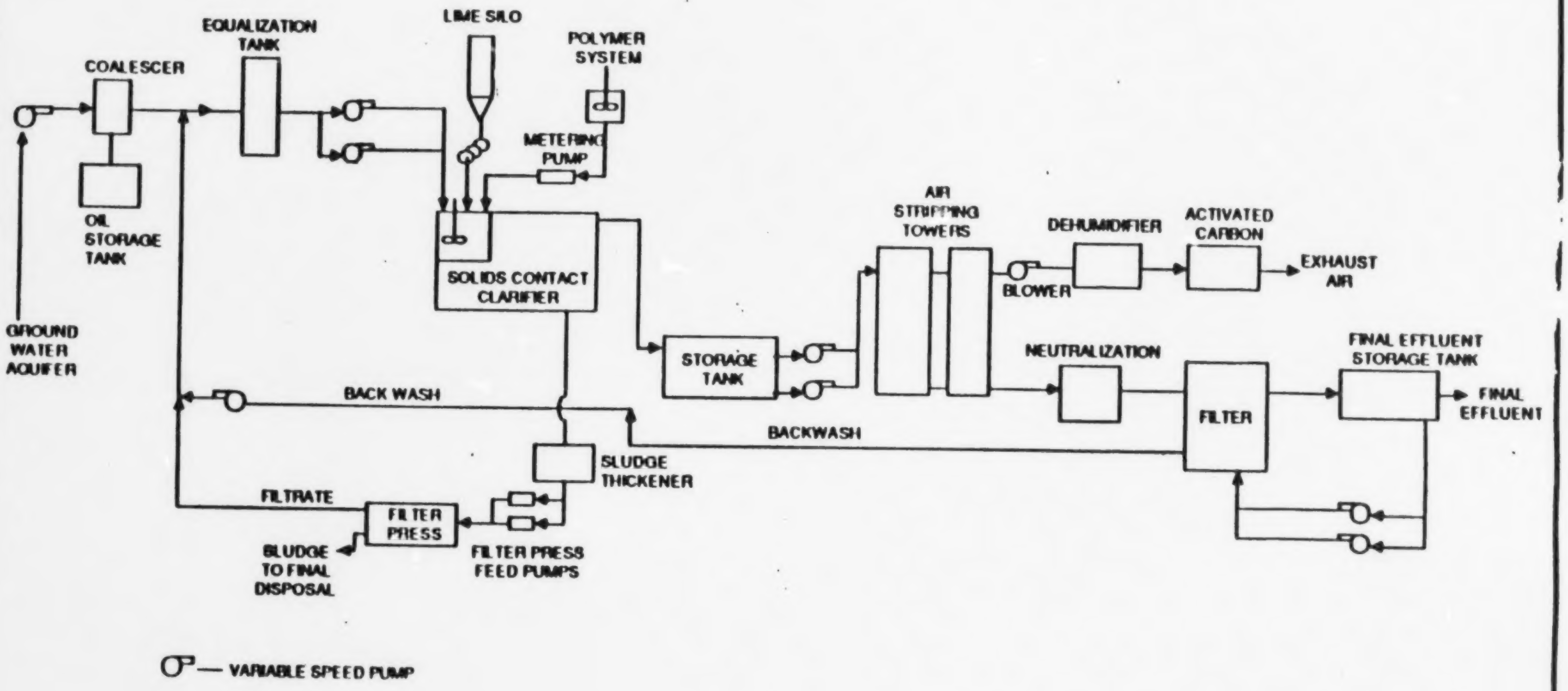
FIGURE 5

GENERAL FLOW CHART FOR GROUNDWATER TREATMENT


COALESCER
EQUALIZATION TANK
LIME SILO
POLYMER SYSTEM
METERING PUMP
OIL STORAGE TANK
SOLIDS CONTACT CLARIFIER
AIR STRIPPING TOWERS
DEHUMIDIFIER
ACTIVATED CARBON
EXHAUST AIR
BLOWER
GROUND WATER AQUIFER
STORAGE TANK
NEUTRALIZATION
FINAL EFFLUENT STORAGE TANK
FINAL EFFLUENT
BACK WASH
FILTER
BACKWASH
SLUDGE THICKENER
FILTRATE
FILTER PRESS
SLUDGE TO FINAL DISPOSAL
FILTER PRESS FEED PUMPS
— VARIABLE SPEED PUMP

DAVIS SITE
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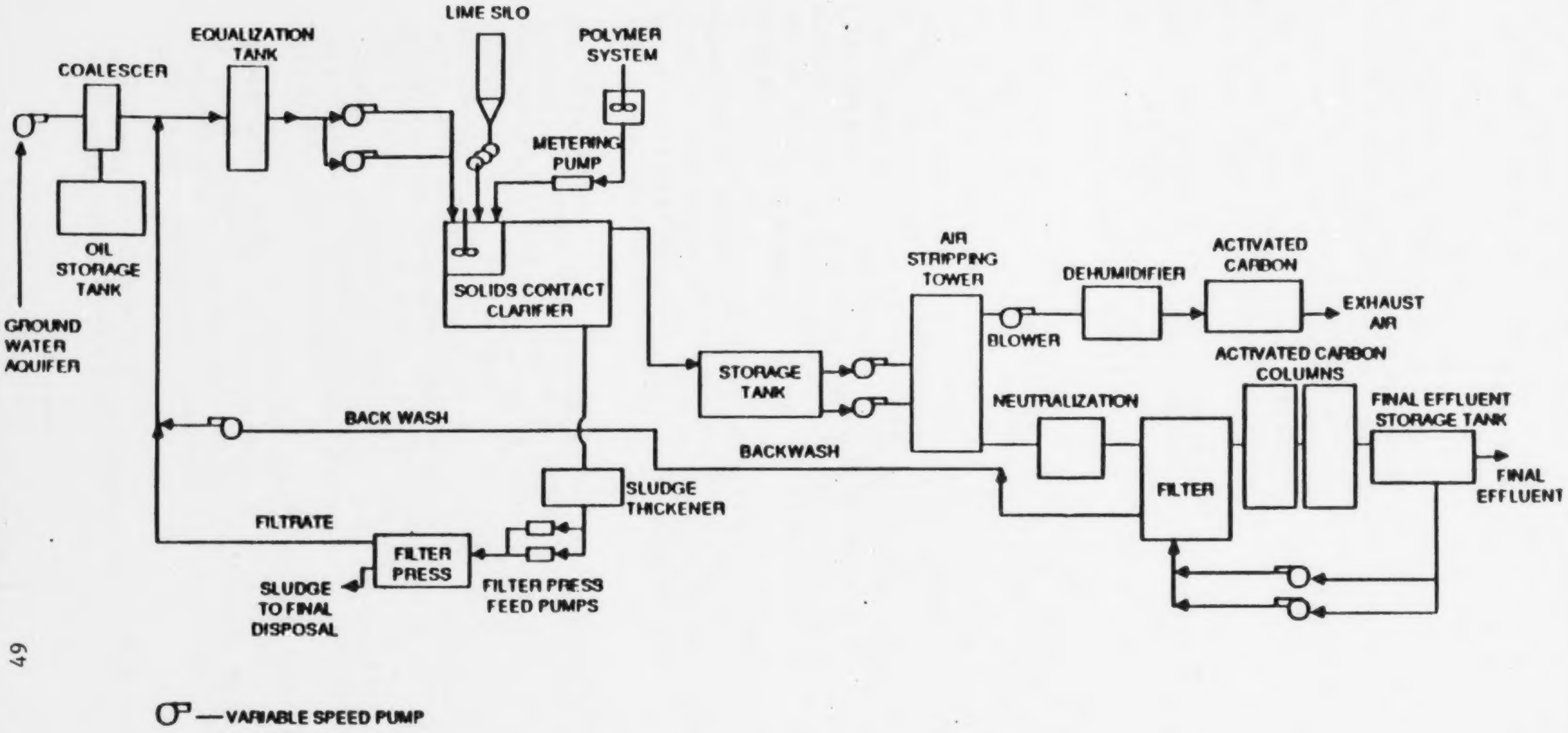
FIGURE 6

FLOW CHART FOR ALTERNATIVE MOM-GW2A


COALESCER
EQUALIZATION TANK
LIME SILO
POLYMER SYSTEM
METERING PUMP
OIL STORAGE TANK
GROUND WATER AQUIFER
SOLIDS CONTACT CLARIFIER
AIR STRIPPING TOWER
DEHUMIDIFIER
ACTIVATED CARBON
EXHAUST AIR
BLOWER
STORAGE TANK
ACTIVATED CARBON COLUMNS
NEUTRALIZATION
FINAL EFFLUENT STORAGE TANK
BACK WASH
BACKWASH
SLUDGE THICKENER
FILTER
FINAL EFFLUENT
FILTRATE
FILTER PRESS
SLUDGE TO FINAL DISPOSAL
FILTER PRESS FEED PUMPS
— VARIABLE SPEED PUMP

DAVIS SITE
SMITHFIELD, RHODE ISLAND
Camp Dresser & McKee Inc.
April 1987

FIGURE 7

FLOW CHART FOR ALTERNATIVE MOM-GW2C

use activated carbon to treat the vapor phase effluent from the air stripping towers.

The total treatment process for this alternative is a proven technology in removing both inorganic and organic compounds with a long history of succcessful operation in municipal water treatment and industrial waste water treatment.

Although the groundwater treatment system which utilizes air stripping without activated carbon polishing will attain a high degree of volatile organic removal, it will not treat the effluent to a level that will achieve the Safe Drinking Water Act (SDWA) MCLs in the groundwater on-site. Therefore air stripping alone will not attain federal and state applicable public health and environmental reqirements for drinking water and surface water quality. The complete treatment system with activated carbon column effluent polishing added will allow federal and state drinking water standards to be attained after five to ten years of operation.

It is estimated that one drum per day of metal hydroxide sludges at approximately 45% solids would be produced by the precipitation/clarification process and require disposal in an on-site or off-site RCRA Subtitle C landfill.

During the operation of this alternative, groundwater and surface water will be sampled to monitor the effectiveness of the treatment system and to prevent any unforeseen public health threat from any increases in contaminants that may migrate from the site. The anticipated benefit of this alternative is that it is expected to mitigate the present off-site migration of contaminated groundwater to private wells thus reducing the risk to public health and the environment. Over the longterm (5 to 10 years) the groundwater under the site or well as off-site will be cleansed to levels that will meet federal and state drinking water quality standards and therefore be protective of public health and the environment.

The implementation of this alternative will require approximately two years of pilot studies, design, construction, and start up time. The actual operating period necessary to attain the target clean up levels is expected to be five or ten years.

This alternative will meet the RCRA 40 C.F.R. Part 264 Subpart F requirements, the Clean Water Act NPDES requirements, and SDWA requirements. Any work conducted in wetlands will comply with EPA Guidance Memorandum," Flood plains and Wetland Assessments for CERCLA Actions," Executive Orders 11988 and 11990 (Wetland Impacts), and RIDEM wetland regulations. If it is necessary to transport spent carbon or metal hydroxide off-site for disposal or processing, the transportation and handling will comply with RCRA 40 C.F.R. Parts 261, 262 and 263 and applicable DOT regulations for transport of hazardous material. The emissions from the air stripping towers will be in compliance with National Ambient Air Quality Standards and emission standards after treatment by vapor phase carbon adsorption. The State of Rhode Island has developed acceptable ambient levels (AAL) for approximately 40 pollutants, which limits will be met. The emissions will also comply with the State's Air Pollution Control Regulations.

This alternative satisfies all of the factors and criteria of the NCP § 300.68(h) and SARA § 121(b)(1).

It will remove contaminants from the groundwater thereby reducing their toxicity and mobility in the groundwater and the opportunity for exposure from contaminated groundwater. The alternative will be effective after 5 to 10 years of operation because it will permanently remove the contaminants form the groundwater. There will be waste residuals to mange on-site in a RCRA landfill. Any adverse effects associated with these metal hydroxide sludges will be mitigated by treatment to immobilize the metals prior to placement in the landfill. It is also anticipated that these residuals could be delisted as a hazardous waste. the risk associated with the waste left on-site will be non-significant.

Cost information from equipment vendors and contractor cost estimating files were used in making capital cost estimates. Cost data from other groundwater clean up projects of similar size and type were also used as references to check the cost basis developed. Presentation of capital costs in the FS includes a breakdown of the major system components such as the collection system, unit treatment processes, pumping, building, electrical work, and site work.

The cost to perform pilot treatability studies is included in the estimate. The treatability studies will take approximately six to nine months to complete and will cost approximately $430,000.

Operation and maintenance costs include labor, chemicals, electrical power, materials and supplies, water, and metal hydroxide sludge disposal. As part of the sensitivity analysis, the O&M costs were calculated for different lengths of operation times which correspond to various health based risk levels. The sensitivity analysis is explained in detail in the FS.

Chemical cost estimates are based on the chemicals required for p^H adjustment, precipitation/coagulation and carbon adsorption. Disposal costs include the cost for metal hydroxide sludge disposal at a RCRA Subtitle C hazardous waste disposal facility.

The total cost for the alternative is the sum of the capital and O&M costs as shown below:

Capital Cost		O&M Cost		Total Cost
$4,305,000	+	$5,275,000	=	$9,580,000

AWS Alternate Water Supply System

This alternative consists of the design and construction of an alternate water supply system to serve those residents that historically and currently are impacted by groundwater contamination from the site, as well as those areas that are down gradient from the contaminated plume that could potentially be affected. The objective of the proposed action is the mitigation of the direct threat from ingestion, inhalation and dermal contact of contaminated ground water emanating from the site. The proposed project consists of a connection to the existing Town of Smithfield water supply system, requiring approximately 2,100 feet of transmission main, 21,000 feet of distribution mains, a storage tank and a booster pumping station. The estimated population to be served ultimately is approximately 475 persons, and the area includes those supply areas that historically have been and could be affected by groundwater contamination from the Davis Liquid Superfund Site.

Potential water supply alternatives were identified in an EPA report dated September 1986, entitled "Current Situation and Proposed Expedited Response Action for the Davis Liquid Site, Smithfield, Rhode Island" (the report). The report describes an engineering evaluation cost analysis of the potential alternatives for supplying water to the affected residents.

The following potential alternatives were considered and rejected for the reasons summarized below:

- Individual well carbon canister. This alternative requires continuous monitoring and replacement and as such is not a permanent remedy.

- New surface water treatment system. This alternative would require more than "simple treatment" and therefore would require considerable pilot treatment work. Also the alternative would more than likely require more than three years to develop. Since the alternate water supply system is needed to abate a near term threat, this alternative would not be effective.

- Development of a new sand and gravel wellfield; new bedrock wellfield. Review of geologic maps of the bedrock and surficial geology of the Georgiaville Quadrangle indicate areas worthy of water supply exploration. However, this alternative has several disadvantages:

    - The time frame necessary to survey the area and develop the water supply yield would extend the period for implementing a water supply beyond the near term requirement

    - It is anticipated that the public would have a very low threshold for acceptance of a groundwater supply located within the same general area and same aquifer, where the disposal site is located.

- The institutional requirements such as purchasing land, taking of land, and the creation of an authority to manage the water supply distribution system would be expected to negate an expeditious implementation of this alternative.

Because of both the near term threat and the potential future threat, it will be necessary to provide an alternate water supply to the affected residents as soon as possible, rather than await completion of remedial activity at the site.

The proposed project schedule for this alternative can be described generally as follows:

- Plane survey and topographic survey work would begin immediatly upon approval, with design and construction to follow. The goal would be to provide clean potable water by October 1988.

This alternative is a permanent solution that eliminates the risk from contaminated groundwater to users of private wells off-site along Log and Burlingame Roads. The alternative is protective of human health and the environment, is effective in the short and long term in mitigating the threat from contaminated drinking water by eliminating exposure, and is easily implemented. Any construction in or near wetlands will comply with the U.S. EPA Policy Guidance Memorandum "Flood Plains and Wetland Assessment for CERCLA Actions" and RIDEM Wetlands Regulations.

The estimated present worth capital cost of this alternative is $2,756,000, which includes design costs, construction cost, design and construction services and 15% project contingencies. The unit costs were based upon actual bid prices for similar projects in Region I. The estimated annual O&M costs were capitalized over the 30 year design life of the system at 10% to yield a present worth cost of $146,788. The total cost for this alternative is:

Capital Cost		O&M Cost		Total Cost
$2,756,000	+	$146,788	=	$2,902,788

MOM-SW 2 Combined Treatment of Contaminated Surface Water in the Groundwater Treatment System

This remedial alternative includes isolating contaminated surface water originiating on the site and routing it through the groundwater treatment system. Implementation of this alternative is dependent upon the selection of the remedy for groundwater cleanup.

A collection box will be installed at the north end of the existi drainage stream through the site to collect surface water emanati from the site. If on-site groundwater treatment is selected as the remedy, then the surface water will be treated and discharged to the groundwater to aid in the flushing of organic contaminants from the soil.

The addition of the surface water for treatment with the groundwater is unlikely to have an adverse impact on the groundwater remediation alternative because the contaminants are similar and the surface water is expected to have contaminant concentrations less than those of the groundwater. This alternative will isolate and prevent surface water runoff from the site to off-site surface waters, thereby mitigating the transport of contaminants to Latham Brook.

This alternative also includes the diversion of the surface water flow from the wetland south of the site to the wetland north of the site and Latham Brook, thereby isolating surface water runoff from the site. This work would be performed in consultation with the RIDEM and in compliance with RIDEM wetlands regulations. Implementation of the alternative will be beneficial in protecting public health and the environment because it will prevent the off-site migration of contaminants in surface water to Latham Brook. The benefit to public health however will be minimal since the health risk posed by the offsite surface water is not significant ($1x10^{-12}$). Surface water quality will improve and the risks to fresh water aquatic life associated with the contamination of Latham Brook will be further reduced. This alternative will comply with all federal and state applicable laws and regulations. It is implementable via existing technology and will be effective over the long term in mitigating the threat to the fresh water aquatic organisms in Latham Brook.

This alternative was assessed taking into account the factors of SARA § 121(b)(1). The option is reliable and effective over the long term because it removes contaminants permanently from the surface water using the best technology currently available. There is no decernable threat to human health or the environment due to the inplementation of the alternative since it does not require excavation or transportation of contaminants.

The capital cost for this alternative includes construction of a concrete box wet well for collection of the surface water runoff, a pumping station with two pumps, and 400 feet of 2 inch piping for delivery of collected water to the groundwater treatment system. The operation and maintenance cost consists of electric power, maintenance of equipment, and labor. The total present worth cost for this alternative is:

Capital Cost		O&M Cost		Total Cost
$332,500	+	$92,200	=	$425,000

MOM-SD3 Off-site Sediment Dredging and Treatment

For this alternative, two feet of sediments in portions of Latham Brook will be removed and treated with the on-site soils. Dredging will be accomplished with a crawler-mounted backhoe following stream diversion and site preparation. Sand bags placed immediately upstream of the first segment of the brook will prevent water from entering the dredging area. A gasoline powered pump will discharge the diverted stream flow to a prepared bed of 2 inch stone placed downstream of the second brook segment in order to prevent scouring of stream sediments. It is anticipated that infiltration to Latham Brook will continue during the implementation. Although this alternative would allow for the complete removal of contaminated sediments for treatment either on-site or off-site, the adverse impact to wetlands and aquatic organisms is expected to be significant over the short term (several years). After diversion of the stream flow and the dredging of the sedimants, it will take several years for the benthic organisms to restablish themselves and for the wetland plants and animal habitat to be restored. When evaluated with respect to the factors of SARA § 121(b)(1) it appears that the potentially significant threat posed to the environment by stream flow diversion and dredging outweighs the risk to aquatic organisms from the toxicity of contaminants that would remain in the sediments. Furthermore should surface water treatment be chosen as a component of the selected remedy the source of sediment contamination would be eliminated.

Since the monitoring aspects of this alternative are included with the surface water alternative, the total cost of sediment dredging consists of the $145,000 capital cost to complete construction of the alternative. Treatment of the excavated sediment is included it the cost estimate for source control alternatives.

VI. Selection of the Remedy

A. Description of the Selected Remedy

The remedial action selected for implementation at the Davis Liquid Waste Superfund Site is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthoriztion Act of 1986 (SARA) and, to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300 *et seq.*, 47 Federal Register 31180 (July 16, 1982), as amended. The selected remedial action is a comprehensive approach for site remediation which includes a source control and management of migration component, together with an alternative water supply. A comprehensive approach is necessary in order to achieve the response objectives established for site remediation and the governing legal requirements.

1. Scope of the Selected Remedy.

The source control component of the selected remedy includes excavation of raw waste and contaminated soils located in the unsaturated zone, treatment onsite by high temperature thermal destruction and disposal of treatment residues which are determined to be hazardous in an on-site RCRA Subtitle C landfill. This technology was included as alternative SC-4 in the detailed evaluation. The unsaturated zone at the site is defined as that zone from the surface elevation to the seasonal low groundwater elevation which, on average, is equivalent to a vertical depth of four feet. High temperature thermal destruction will destroy nearly all of the volatile and extractable organic contamination from the raw waste and source soils. Some metal bearing waste residues will be disposed of on-site in a RCRA Subtitle C landfill. During design, residue from pilot plants will be tested and stabilized using stabilization/solidification technology if necessary should they be determined to be hazardous wastes. For those wastes that are hazardous and have been stabilized, a delisting study may be conducted to determine whether or not there is a need to continue to manage them as a hazardous waste. The testing and study will impact the size of the landfill needed and the type of postclosure care.

This remedy requires extensive on-site handling and processing of 25,000 cubic yards of raw waste and contaminated source soils. In an effort to mitigate the potential for off-site migration of gaseous emissions, contaminated dust, and odors, controlled methods of excavation and handling, will be employed.

The raw waste and some of the source soils are located in areas classified as wetlands (Northern Disposal Pit, drainage ditch, unnamed stream) and are within 100 feet of areas classified as wetlands (swamp area to the south and east of the site). Work in these areas will require the relocation of used tires stored on-si and employment of measures to prevent contaminated surface runoff and soils from entering adjacent wetland areas. Tires will be removed from the work area and wetlands within the work area. Also a 100 foot buffer will be maintained between work areas and wetlands. During work on the site, silt screens will be maintained to prevent contaminated surface runoff and soils from entering wetlands.

As part of the selected remedy, the surface water runoff and groundwater recharge to the unnamed stream on-site will be isolated for collection and treatment with the groundwater treatment system which has been selected as part of the remedy. To accomplish this it will be necessary to divert surface water flow which now flows through the site in the unnamed drainage stream from the southern swamp area to the northern swamp area and to Latham Brook.

This isolation of the site from the adjacent wetland areas by capturing runoff for treatment, diverting flow around the site, and installation of silt screens within the 100 foot buffer will protect the wetlands from any adverse impact during excavation and handling of waste and contaminated soil.

Upon completion of remedial activities all areas in wetlands disturbed by the remedial action will be restored. Altered wetland areas will be replaced by equivalent wetland types. The restoration program will be developed in consultation with the RIDEM Division of Water Resources during design of the selected remedy. The RIDEM will identify the factors which are key to a successful replacement of any altered wetland areas. Such factors may include, but not necessarily be limited to replacement of wetland soil types and provisions for vegetative reestablishment including transplanting, seeding, or some combination thereof.

The incineration of raw waste and contaminated soils through high temperature on-site treatment will require pilot work to set operational parameters and to choose the most effective unit for the site specific waste and conditions at the Davis site. Waste and soils will be excavated and stockpiled for incineration under carefully controlled conditions. It is anticipated that no more than one days' processing capacity of contaminated soils will be stockpiled on-site at any time.

Waste and soils will be introduced at a uniform rate into the incineration combustion chamber. As they pass through the chamber organic liquids and solids will be substantially oxidized to gases and ash. The operating temperature in the combustion chamber will range between 1500-3000°F and residence time will be in the order 60 - 90 seconds. Treated ash and soils discharged at the completion of the combustion process will be quenched with water to cool the ash and control dust prior to analysis for organic and inorganic content. Afterburners will be used to complete the combustion of the thermal unit off-gases prior to passing the gases through a wet scrubber to control acid emission and a bag house filter to control particulates. Wastes containing metals will produce an ash containing metals. Therefore, the combination of treated soils and ash will be analyzed for metal content using the EP toxicity test to determine if it requires further treatment or if it can be used as backfill. If the metals content exceeds the Maximum Concentration for Characteristic of EP toxicity listed in Table 1 of 40 CFR § 261.24, then the soil/ash combination will be treated to reduce contaminant mobility using stabilization/solidification technology and placed in an on-site RCRA Subtitle C landfill meeting the requirements of 40 CFR Part 264, Subpart N-Landfills.

The thermal destruction process will require construction of a haul road from the source area to the on-site thermal unit, a screened feed hopper within an enclosure capable of accepting a front end loader, a conveyor from the feed hopper to the thermal unit, a combustion chamber for drying, heating and gasifying the raw waste and source soil, an afterburner to insure destruction of volatile and extractable organics, a wet scrubber to neutralize acid gas emissions and a baghouse filter for particulate control, and a stack to vent water vapor and gases above the work area. The process will be enclosed to control fugitive dust and volatile organic emissions. Treated soil and soil/ash combinations which meet cleanup target levels will be used to refill the excavated areas.

Twenty-five thousand cubic yards of raw waste and contaminated soil will be treated by the process which will reduce the toxicity and mobility of the contaminants by a signifcant amount. The system, however, will only moderately reduce the volume of soil treated. It is anticipated that design and construction of the remedy would require about six months to one year of work which would be followed by two years of operation at 60 cubic yards a day to reach target clean up levels in the soil of 2ppm total volatile organic concentration. The total present worth cost for the selected source control remedy is $14,912,000.

The management of migration element of the selected rememdy consists of two components:

(1) The design and construction of an alternate water supply system to protect public health by eliminating exposure to contaminants that have impacted and will continue in the future to impact offsite private wells; and (2) the design and construction of a groundwater extraction, treatment, and soil flushing system to reduce the contaminant levels in groundwater on-site to levels that are protective of human health and the environment.

Because the site was active throughout the 1970's, the probable exposure to contaminants can be estimated to be fifteen to seventeen years at this time. Region I estimates that to clean the overburden and bedrock aquifers to protective levels for organic contaminants may take as long as five to ten years after the selected remedial action is installed and operating effectively. In addition, work on-site to construct the remedy may alter groundwater flow rates and paths of contaminant migration. Due to the site specific uncertainties concerning contaminant migration EPA believes that an alternate water supply will achieve the goal of public health protection and is timely when consideration is given to the long term treatment necessary to clean the contaminated aquifers.

The alternate water supply system will serve those residents already impacted by groundwater contamination from the Davis Liquid site and those that may potentially be affected. The objective of the remedy is the mitigation of the direct threat from ingestion, inhalation, and dermal contact of contaminated groundwater emmanating from the Davis Site. The project consists of a connection to the existing water supply system of the Town of Smithfield requiring approximately 2,100 feet of transmission main, 21,000 feet of distribution mains, a storage tank and a booster pumping station. The estimated population to be served ultimately is approximately 475 persons. The areas included are those water supply areas potentially affected by groundwater contamination from the Davis Liquid Superfund Site along Log Road and Burlingame Road. In order to reduce the risk of increased exposure to the affected population, the construction of the alternate water supply system will be completed and put into operation prior to any on-site work that would disturb contaminated areas.

This component of the selected remedy has a total present worth cost of $2,900,000 and provides significant public health protection for this expenditure over the term required for the groundwater treatment system to reach cleanup levels that are protective.

The groundwater treatment components consist of: groundwater extraction and treatment and a soil flushing system. The groundwater will be extracted from wells located in areas of high contamination, passed through the treatment facility, and discharged via a distribution system over the soils. The overburden aquifer will be pumped first and the bedrock aquifer will be pumped during the latter years of treatment. The soils within the recirculation area will be flushed by this process, thus reducing the levels of organic compounds in the soils. Contaminated groundwater will be treated using oil and floatable solids removal, metals precipitation, air stripping, and carbon adsorption. Although, the oil removal and metals precipitation systems are necessary to ensure proper operation and effectiveness of the air stripping columns and carbon adsorption systems, they are expected to have the additional benefit of reducing arsenic, and lead in groundwater to levels presenting non-significant health risk. The carbon adsorption system will be used during the latter years of remediation to assure that the groundwater cleanup goal will be achieved.

Groundwater extraction will proceed for a two year period form the date of implementation. At the end of the two year period an evaluation will be made by EPA to assess progress in meeting that remedial objectives are not achievable, EPA will re-evaluate the objectives and its remedial approach. Groundwater remediatio will cease upon achieving 5 ppb of benzene, 5 ppb tricholroethylene (TCE) and 5 ppb Tetrachloroethylene (PCE) in every on-site well. At that time EPA will determine if groundwater quality is protective of public health and the environment.

The selected remedy also includes the collection and treatment of the on-site surface drainage stream which runs through the tire storage pile. Surface water will be collected at the stream's discharge on the northern side of the tire pile and pumped to the groundwater treatment facility. The air emissions from the air stripping system will be treated using vapor phase activated carbon to remove organics. EPA estimates that it will be necessary to operate this facility for five to ten years in order to attain a level of groundwater cleanup that is protective of human health. Throughout the implementation of the remedial action for the site, the Agency will conduct a comprehensive field monitoring program including ambient air, stack emissions, groundwater and surface water sampling and analysis.

The groundwater treatment component of the selected remedy has a present worth total cost of $9,580,000.

The total present worht cost for the selected remedy is $27,392,000 and consists of:

- Source control:

  Excavation of raw waste and soils, incineration, replacement of treated soils, landfilling of hazardous waste treatment residues, wetlands protection and restoration and all associated short and long term monitoring, operation and maintenance. Total cost $14,912,000.

- Management of Migration

  - Alternate water supply system. Total cost $2,900,000.

  - Ground water extraction, treatment, soil flushing, longterm monitoring, operation and maintenance, wetlands protection, and restoration site closure. Total cost $9,580,000.

An estimated schedule of remedial actions is shown below:

Estimated Remedial Schedule

	1987	1988	1989	1990	1991	1992	1993	1994	>>>>>	2000
1. Record of Decision	X									
2. Construction of Alternate Water Supply		X								
3. Design of Remedial Action		X								
4. Start-up of source Control Remedy			X							
5. Completion of source Control Remedy					X					
6. Start-up of Groundwater Treatment Remedy				X						
7. Completion of Groundwater Treatment										X

2. Performance Goals of the Selected Remedy

a. Performance Goals of the Alternate Water Supply

The available information on the site indicates that the most important exposure pathways for off-site receptors is the movement of site contaminants in groundwater to private wells. Over 25 of the 42 private wells sampled by the Rhode Island Department of Health (RIDOH) and Camp, Dresser and McKee (CDM) are located in the site drainage area along Log and Burlingame Roads. These wells include shallow, hand dug wells supplied primarily by groundwater from the surficial aquifers and deeper wells that are screened in the bedrock aquifer. The private wells closest to the site are approximately 2,000 feet northeast of the on-site tire pile. Both RIDOH and CDM found contaminants in many of these wells.

Residents with private wells are exposed to contaminants in the groundwater through ingestion, inhalation of contaminants volatilized during household use of the water, and dermal absorption of chemicals while showering or bathing. Although six residences have been supplied with bottled water since the spring of 1985, most nearby residents continue to use water from their own wells. Even residents using bottled water for drinking and cooking will continue to be exposed to contaminants as a result of other uses of the well water. In particular, inhalation of organic compounds that volatilize from the water during household use may also contribute to the health risk for residents living near the site since numerous volatile organic compounds have been measured in both private and observation wells.

The maximum levels of contamination detected in residential well water by CDM in 1984 and 1985 were used to determine worst-case exposure concentrations for persons drinking the water. Geometric mean concentrations were not calculated because the nature of the results of the sample analyses did not allow characterization of "most probable" exposure point concentrations. This judgment was based on three factors:

- There were no consistent trends observed in the 1984 and 1985 private well analytical data, either spatially or temporally.
- Many well depths could not be accurately determined, and use of well water by residents before the sampling was not known.
- All of the indicator compounds, except lead and trichloroethylene were detected fewer than three times in more than 37 samples.

It is important to recognize that between 1980 and 1984, and possibly earlier, the concentrations of a few chlorinated compounds in some private wells were much higher than after 1984, in some cases by as much as two or three orders of magnitude.

Table 12 lists eight human health indicator chemicals that were detected in private wells, their maximum concentrations measured in private wells and in onsite wells during the RI (1984-1985) and their respective Drinking, EPA Health Advisories and MCLs where available.

TABLE 12

Indicator Chemicals Detected in Private and Observation Wells.

			EPA Health Advisories		
Chemical	OW MAX(ppb) Concentration	PW	10 day a (ppb)	Lifetime (ppb)	MCL (ppb)
Arsenic	128	15.0	50	50	50
Benzene	190	7.8	235	NA	5
Chloroform	2,000	11.0	NA	NA	100
1,1-Dichloroethylene	74	7.4	1000	7	7
Lead	175	23	NA	NA	50(20[b])
Tetrachloroethylene	39,000	ND	2000	10[c]	
Trichloroethylene	6,600	31	NA	NA	5(0[b])
Total xylenes	14,000	20	7800	440	440[b]

a=10-day/10 kg child; b=proposed MCL goal; c= class C compound assumed; PW-private well; OW=Observation well; ND= not detected.

Maximum Contaminant Levels (MCLs) developed under the Safe Drinking Water Act are currently available for trihalomethanes (chloroform), lead, arsenic 1,1-dichloroethylene, trichloroethylene, and benzene (Table 10). The EPA Office of Drinking Water has also proposed MCL goals (MCLGs) for xylenes lead and arsenic of 440 ppb, 20 ppb and 50 ppb, respectively. The maximum concentrations of 1,1-dichloroethylene, trichloroethylene and benzene detected in residential wells exceed their respective MCLs. Maximum Concentrations detected in observation wells on-site for both arsenic and xylenes is about two times the Health Advisory calculated for ten day exposure for a 10 kg child. Although not detected in private wells PCE was found in concentrations twenty times greater than the ten day health advisory for a 10kg child.

The potential exists that contaminant levels in private wells will increase once remediation of the site begins and as the contaminated plume intercepts these private wells. The high levels of these contaminants found on-site, the fact that these contaminants have been detected in private wells, and the complex hydrology of the site coupled with the uncertain impact on the contaminant plume migration by the source control remedy indicates a potential threat for further contamination exits.

The risks posed by ingestion of contaminated well water were assessed quantitatively. The risk estimates presented in Table 13 indicate that the individual carcinogenic compounds pose cancer risks of 10^{-} or greater at the maximum measured concentration. The quantitative risk estimate does not take into account exposure through inhalation and dermal contact with the contaminated water which might contribute as great a risk as that derived from ingestion. It also does not address the additive effect and/or interaction potential for chemicals that occur concurrently in the mixture.

TABLE 13

RISKS POSED BY CHEMICALS IN RESIDENTIAL WELL WATER

(Present Site Use)

Potential Carcinogen	EPA classification	Unit Risk $(ppb)^{-1}$	Estimated Risk
Arsenic	A	$4x10^{-4}$	$6x10^{-3}$*
Benzene	A	$1.5x10^{-6}$	$1x10^{-5}$
Chloroform	B2	$2x10^{-6}$	$2x10^{-5}$
Trichloroethylene	B2	$3.1x1^{-7}$	$1x10^{-5}$
1,1-Dichloroethylene	C	$4.3x10^{-6}$	$3.4x10^{-5}$

* EPA Risk Assessment Council recommends that the risk calculation for Arsenic through ingestion be scaled down one or two orders of magnitude.

The hydrogeology of the regional groundwater flow system at the site is complicated by the existence of a bedrock dike which is thought to effect groundwater flow in in the overburden and bedrock. In effect this impediment to flow in the over burden aquifer may cause contaminants in the overburden aquifer to pool along the western edge of the dike, and enable the heavier compounds to move vertically downward into the bedrock. This effect is exhibited by the increase of contaminants in the bedrock wells above those levels in the overburden wells. It is also important to note that the 1985 concentrations in the bedrock wells are higher than the 1984 concentrations. The groundwater in the bedrock flows regionally from the site to the east and northeast toward the residential wells along Log and Burlingame Roads providing a potential for contamination of residential wells downgradient of the site. It is uncertain from the data whether the highest contamination of the migrating plume has reached these residential wells or will reach them in the future.

The population affected by the contaminated groundwater from the site has already been exposed to potentially hazardous levels of carcinogens for a significant period of time possibly throughout the 1970's or about 15 or more years. It's estimated that to clean the overburden and bedrock aquifers to protective levels for organic contaminants may take as long as five to ten years after the remedial action is installed an operating effectively.

Because of these previously discussed factors, emphasis should be placed on a remedial action that adequately and reliably reduces the potential health effects posed to the residents being affected or having the potential to be affected by the site. The installation of an alternate water supply before construction of the source control remedy is considered to be the most effective way to achieve this goal.

b. Performance Goals of the Source Control and the Ground and Surface Water Teatment Remedies

Cleanup levels for the Davis Site were developed based on the Baseline Risk Assessment in the RI and upon the indicator chemicals and exposure pathways under the conservative exposure scenarios for each medium (air, soil, ground and surface water) in the public health evaluation. This evaluation assessed the present and future potential risk to public health and the environment associated with exposure to contaminants from the Davis Site in the absence of remediation.

Benzene, trichloroethylene and tetrachloroethylene have been chosen as the compounds used to develop cleanup levels for groundwater treatment because thes compounds contribute the majority of the potential risk. Although vinyl chloride also contributes a significan portion of the risk, it is relatively easy to remove by air stripping. As previously discussed it is expected that the metals such as arsenic, cadmimum and lead found on-site will be removed during the precipitation in the groundwater treatment process.

The Maximum Contaminant Level for benzene and trichlorethylene (TCE) set by the Safe Drinking Water Act is 5 ppb. Because PCE has similar chemical, physical and toxicological properties as TCE, the same clean up level is proposed for PCE. Using a cleanup level of 5 ppb each for benzene, TCE and PCE, the incremental lifetime excess cancer risk from exposure to groundwater containing the chemical mixture would be approximately 1.3 x 10^{-5}.

Several exposure pathways were elevated for health risk from contaminated soils including ingestion, inhalation and dermal contact and, de-adsorption of contaminants from the soil particles into the groundwater.

The principal health risk was determined to be the contribution of volatile organic contaminants to the groundwater from contaminated soils on-site under conditions for future development of the site for residential use. A cleanup level of 5 ppb each for benzene, TCE and PCE equates to an incremental lifetime cancer risk from exposure to groundwater containing the chemical mixture of approximately 1.3 x 10^{-5}.

Since the volatile organic components of soil contamination constitute a primary source of groundwater contamination, a cleanup goal was set for both groundwater and soils using groundwater quality as the basis for the cleanup. Of all of the numerous volatile organic compounds found in the groundwater on-site, tetrachloroethylene (PCE) was found to be one of the contaminants having the highest concentrations. PCE is estimated to constitute approximately 54% of the total volatile organic contaminant mass in the soils and is also more difficult to remove from the contaminated groundwater than the other volatile organics that were found. Because of these factors, PCE was chosen as the principal indicator chemical to calculate cleanup levels for soils.

Estimated treatment times for health based cleanup (target) levels for the site were calculated using standard, computerized pump and flush removal models. Two models were chosen as most appropriate for the site. These models and assumptions used in calculating the input data are discussed below.

Tetrachloroethylene (PCE) was selected as the target compound for this exercise because it makes up 54% fo the source soils, it is a compound which adheres to soil particles more than most volatile organics (making it more difficult to remove) and because it was selected in the Risk Assessment as a health indicator compound.

The PCE target level is 6.9 ppb of a 10^{-5} risk level. A conservative approach was used for the models, assuming that PCE was the only contaminant. In other words, the total mass of volatile organics was assumed to be PCE. Therefore, the allowable concentration of total volatile organics in the groundwater was taken as 6.9 ppb.

The mass of contaminants in the saturated soil and groundwater we estimated with analytical data presented in the Remedial Investig c Report. The volume of contamination in the saturated zone (unsaturat zone will be removed) was estimated by assuming an aerial extent equal to that of the contamination found in the unsaturated soils just above the water table and a vertical extent of the entire 15 feet of the saturated soil. These assumptions were thought to be conservative to include all of the contamination.

The volume of the groundwater = 20 x 10^6 gallons
The volue of the saturated soil = 2,000,000 ft^3

An average PCE concentration of the groundwater was estimated utilizing the average concentration of PCE in the highly concentrated overburden aquifer (1,107 ppb) based on wells OW-93, OW-51 and OW-52 located in and near to the source areas. Consequently, the total mass of PCE in the groundwater was calculated as 84 kg. Therefore, the total volatile organic mass (assuming PCE = 3% of total volatile organics) was 2,800 kg. (36,900 ppb).

The mass of PCE in the saturated soils was estimated using the relationship between the water concentration and soil concentration as determined by the kd partitioning coefficient.
In summary, Kd is dependent of the fraction of organic carbon (Foc) and the organic carbon partitioning coefficient (Koc) of the soil. For this, Kd equals 0.214 for PCE and the average (for total volatile organics) Kd equals .24

$$Kd = \frac{C\ soil}{c\ water} \qquad \text{where } C = \text{Concentration}$$

Therefore, the PCE concentration in soil is 237 ppb (15 kg), which yields a TVO concentration of 7,900 ppb (500 kg). The two models investigated are referred to as Model "C" and Model "B". Model "C" starts with the initial masses of contaminants in the water and soil and uses the leaching factor (Kl) to estimate the lengths of cleanup to reach a risk level of 10^{-5}. The leaching factor used was one determined in a bench scale study of volatile organic leaching for a different Superfund site. This model also requires a pumping rate. The estimated maximum and minimum rate attainable was determined to be 75 gpm and 25 gpm respectively. The pumping rate used in the model was 40 gpm, the average value.

Model "B" used the initial water concentration and Kd = 0.214 to determine the estimated clean up times. Model "B" uses various combinations of the Kd and concentrations to determine the time required to attain a risk level of 10^{-5}. The pumping rate was 40 gpm.

A sensitivity analysis was conducted to determine the effect of the model's parameters on the length of cleanup to reach a 10^{-5} risk level. The results of the analysis show that the cleanup time for both models is most sensitive to changes in Kd. A relatively linear relationship exists between the change in Kd and the change in clean up time. A 20% increase in the Kd results is approximately 3 1/2 year increase in clean-up time. In conclusion, these models indicate that the length of the groundwater treatment for the Davis site will be between five and ten years.

Based on the results of the two models, an estimated five to ten aquifer volumes will have to be pumped and treated over a period of five to ten years to attain the target cleanup levels in the aquifer directly beneath the site. As previously discussed, groundwater remediation will cease upon achieving 5 ppb of benzene, 5 ppb of trichloroethylene and 5 ppb of tetrachloroethylene in every on-site well.

The volatile organic concentrations in soils that will contribute to estimated cancer risk levels of 10^{-4} to 10^{-7} in the groundwater were developed.

Estimated Cancer Risk Level	Estimated Onsite Residual Volatile Organic Concentration
10^{-4}	20 ppm
10^{-5}	2 ppm
10^{-6}	0.2 ppm
10^{-7}	0.02 ppm

Based on the remaining volatile organic concentrations in the soils, a corresponding volume of contaminated soils requiring excavation and treatment was estimated.

Estimated Onsite Residual Volatile Organic Concentrations	Estimated Corresponding Soil Volume
20 ppm	20,000 yd^3
2 ppm	25,000 yd^3
0.2 ppm	30,000 yd^3
0.02 ppm	35,000 yd^3

It will be necessary to treat 25,000 yd^3 of soils contaminated at levels of 2 ppm or higher total volatile organics in order to reduce the soil contaminant contribution to the groundwater to a level which will allow the groundwater treatment system to reach the target cleanup level in five to ten years.

B. Statutory Determinations

CERCLA as amended by SARA (hereinafter referred to as SARA) requires the Agency to select remedial actions, to be carried out under Section 104 of SARA or secured under Section 106 of SARA, which are in accordance with Section 121 of SARA and, to the extent practicable, the NCP. The selected remedy presented herein is consistent with SARA including the cleanup standards in Section 121, and to the extent practicable, the NCP.

Under its legal authorities, EPA's primary responsibility at CERCLA sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of SARA provides a number of factors and procedures for the Agency to consider and follow in selecting remedies.

First, Section 121(b) creates a strong statutory preference for remedial actions that utilize treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants or contaminants as a principal element. The statute prescribes that, in choosing a final remedy, the Agency must select a remedial action that is cost effective and uses permanent solutions and alternative treatment technologies or resource recovery technologies. In addition, EPA may select an alternative remedial action meeting the objectives of Section 121 whether or not such action has been achieved in practice at any other facility or site that has similar characteristics.

Further, Section 121(d) provides that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws.

1. Protectiveness

a. Source Control

EPA has determined that the 2 ppm cleanup level for total volatile organic concentration in soils is protective of human health and the environment based upon a number of reasonable and valid assumptions. First, the Agency has assumed that the site has considerable potential for future residential development. Should such development occur, in the absence of remediation, an individual might well be exposed to contaminated soils in the unsaturated zone. The site is presently zoned for single family residential and agricultural use. In the area surrounding the site, residential development is under construction along Log and Burlinglame Roads. EPA has reasonably assumed in its exposure analysis that individuals would seek to develop the Davis site and the immediately surrounding property for residential use.

The 2 ppm cleanup level for soil is associated with an excess cancer risk of approximately 10^{-5} via ingestion of groundwater.

The soil contribution to contamination of groundwater posed the controlling risk for the site. Under present site conditions the overall excess cancer risk due to inhalation exposure to contaminated soils is estimated to be approximately 10^{-5}, and due to dermal contact and subsequent ingestion it is estimated to be approximately 10^{-4}. The excavation of soils to the 2 ppm level of volatile organics which is necessary to attain the groundwater cleanup level will therefore effectively reduce the public health risk due to soil exposure to the non-significant level.

b. Management of Migration

The Agency's decision to restore the groundwater at the site to a cancer risk level of 1 X 10^{-5} was based on several factors. First, EPA considered the Agency's *Groundwater Protection Strategy* (GWPS) (Office of Groundwater Protection August, 1984). The GWPS provides guidance concerning how different groundwaters throughout the country should be classified and to what extent cleaning up a particular groundwater is appropriate, given where it fits into the classification scheme. EPA also considered the Agency's draft *Guidance on Remedial Actions for Contaminated Groundwater At Superfund Sites*. (October, 1986). This guidance directs the Agency to consider a 10^{-4} - 10^{-7} range of risk levels in selecting the appropriate risk level for the groundwater at the site.

The policy under the GWPS establishes groundwater protection goals based on "the highest beneficial uses to which groundwater having significant water resources value can presently or potentially be put." Guidelines for protection of aquifers are differentially based, relative to characteristics of vulnerability, use and value. Under the classification scheme, the groundwater at the site is Class II groundwater. This groundwater is considered to be a current drinking water source since groundwater is used for drinking water within a two mile radius of the site, (the classification review area).

EPA believes that active restoration of the groundwater is appropriate for the site. Presently, the residents in the area obtain their groundwater from both the overburden and bedrock aquifer systems. Contamination in the bedrock aquifer has migrated beyond the site boundaries and is currently impacting private wells and potentially may impact the quality of drinking water in other downgradient wells in the future.

Finally, it is reasonable to assume that a residence could be placed on or near the site following remediation. As mentioned previously, source soils will be remediated to levels that are protective of human health and the environment. Under these circumstances, groundwater obtained from aquifers directly beneath the site could be used for drinking water purposes.

Consistent with the draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites and EPA's Superfu Public Health Evaluation Manual, EPA evaluated a risk range of 10^{-4} to 10^{-7} individual lifetime cancer risks for carcinogens in selecting a risk level for groundwater. In selecting the appropriate risk level for the site and the rate of restoration, EPA considered the following major factors:

1. Site and groundwater characteristics;
2. Cost, reliability, speed and technical feasibility of groundwater response actions;
3. Anticipated future need for the groundwater;
4. Potential for spreading of the contaminant plume; and
5. Effectiveness and reliability of institutional controls.

EPA applied drinking water standards (MCLs) in establishing the appropriate cleanup level for the site. As the legally enforceable standards under the Safe Drinking Water Act, MCLs determine the level of water quality that is acceptable for consumption by people who obtain their drinking water from public water supplies. Cleaning target levels of 5 ppb each for benzene, trichoroethylene, and tetrachloroethylene the federal requirement set under the Safe Drinking Water Act. An incremental lifetime cancer risk of 10^{-5} associated with exposure to this chemical matrix in water is considered by EPA to be adequately protective of public health.

For several reasons, EPA rejects a level of 10^{-4}. First, this is a Class II aquifer which is presently being used as a drinking water source. EPA anticipates that the area surrounding the site will continue to be developed for residential use, thus increasing the future need of this aquifer. Furthermore, the uncertainty of achieving a uniform cleanup target through the aquifer has caused EPA to choose the more protective level.

Secondly, Section 121 of SARA requires that Superfund response actions must attain applicable or relevant and appropriate requirements. MCLs under the Safe Drinking Water Act are ARAR's for site remediation. If groundwater were remediated to a 10^{-4} risk level, the residual concentrations of individual contaminants would be in excess of their MCLs.

EPA also rejects 10^{-6} and 10^{-7} risk levels. Although the population in the area has historically been exposed to potentially hazardous levels of contaminants for an extended period of time, the alternate water supply selected as part of the remedy will eliminate the exposure and threat of exposure in the future thereby reducing the exposure of the impacted population to a no effect level during remediation of the site. Secondly, due to the complex nature of the fractured bedrock aquifer system and the high concentrations of a wide variety of contaminants found in the groundwater, the technical and economic feasibility of remediating groundwater to a level more protective than the incremental lifetime cancer risk of 10^{-5} may be limited.

The aquifer characteristics and level of contaminants in groundwater limit the rate of restoration. At a maximum pumping rate of 40 gpm, the groundwater can be restored to a 1×10^{-5} risk level within five to ten years. Higher pumping rates may induce water from adjacent surface waters, impeding the groundwater treatment system efficiency and the ability of the system to attain the cleanup levels.

2. Consistency with Other Environmental Laws

Environmental laws which are applicable or relevant and appropriate to the recommended source control and management of migration alternatives at the Davis site are:

- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act
- Safe Drinking Water Act
- Executive Order 11990 (Protection of Wetlands)
- Toxic Substances and Control Act (TSCA)
- Clean Air Act

As specified in the Detailed Analysis of Alternatives Section, the recommended alternative is expected to comply with the above laws. The State of Rhode Island has not identified any ARAR more stringent than those contained in the above Federal ARAR's. Rhode Island does prohibit land disposal of designated highly hazardous chemicals, such as PCB's but none are a factor at the Davis site.

The Resource Conservation and Recovery Act (RCRA) closure regulations require closure by removal of waste, waste residues and contaminated subsoils which is equivalent to closure as a surface impoundment or waste pile (40 CFR Part 264, Subpart K and L); or closure as a landfill by capping and appropriate post-closure care (40 CFR 264, Subpart N). The proposed remediation at the Davis site will attain the general RCRA closure performance standards as specified in 40 CFR § 264.111 at the conclusion of the remedial action.

The owner or operator must close the facility in a manner that:

(a) Minimizes the need for further maintenance; and

(b) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and

(c) Complies with the closure requirements of Subpart G including, but not limited to, the requirements of §§ 264.178, 264.197, 264.228, 264.258, 264.280, 264.310 and 264.351.

The disposal of hazardous treatment residues onsite will meet all the requirements of 40 CFR Part 264, Subparts F-Releases From Solid Waste Management Units and N-Landfills.

The proposed remediation attains the general RCRA performance goals by utilizing the relevant and appropriate sections of closure by excavation and treatment of raw waste and source soils and treatment of contaminated groundwater. Excavation and treatment of contaminated soils above the 2 ppm target will result in the removal of a large majority of organic contaminants, and it will prevent the ingestion inhalation and direct contact threat from those contaminants. The management of migration pump and treat system will minimize and eliminate to the extent necessary the migration of contaminants in groundwater from the site.

For management of migration measures, the specific relevant federal statutes and regulations are the RCRA groundwater protection requirements (40 CFR 264, Subpart F), the Clean Water Act and the Safe Drinking Water Act. The groundwater protection regulations require the setting of groundwater protection standards which must be protective of public health and the environment. The target levels of PCE, TCE and benzene are site specific levels that the Agency has determined will adequately protect public health and the environment. The remediation will attempt to achieve these levels onsite at the point of compliance under the site which is assumed to be the point of future use.

A groundwater monitoring system will be implemented consistent with 40 CFR § 264.100(d).

The remediation of groundwater is consistent with the U.S. EPA Groundwater Protection Strategy (GWPS), which classifies the aquifer at the Davis site as II and requires the restoration of these aquifers. This remediation program would also be consistent with the Rhode Island Department of Environmental Protection (RIDEM) groundwater protection rules and regulations.

Excavation, filling and restoration of any work in wetlands will comply with the technical intent of Executive Order 11990 -- Protection of Wetlands, the Clean Water Act § 404(b)(1) guidelines and the RI Wetland Protection Act. The excavation will be performed to minimize the disturbance of the wetlands.

3. Cost Effectiveness and Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

On-site soils are acting as a continuous source of volatile organic contamination for the groundwater. Groundwater in both the overburden and bedrock aquifer systems is primarily contaminated with VOCs that are carcinogens or suspected carcinogens. Contaminants in the overburden aquifer are predominantly discharging to adjacent surface waters and, in turn, are migrating away from the site. Contamination in the bedrock system has migrated beyond the boundaries of the site and impacted private residual wells.

On-site thermal destruction is a treatment technology that will provide a permanent solution to the organic contamination at the site. Treatment of the contaminated soils in the unsaturated zone to 2 ppm will reduce the risks posed to human health from direct contact with on-site soils by significantly reducing the volume and toxicity of the contaminants. The soil treatment will also reduce the VOC contribution to groundwater in the saturated zone, thus reducing the time for the cleanup of groundwater by eliminating a significant source of contamination to the groundwater.

In comparison to off-site thermal destruction (incineration), on-site low temperature thermal treatment and on-site thermal destruction are more cost-effective while providing a similar level of reliability and protectiveness. The primary differences between the treatment alternatives is that offsite thermal destruction requires available capacity at commercial incineration facilities and therefore is less easily implemented and more costly.

Cleanup of the contaminated groundwater will be accomplished using the best demonstrated available technology. The final design of the unit processes will be determined following completion of the treatability studies scheduled to be conducted during remedial design.

Treatment and recirculation of the groundwater will permanently and significantly reduce the volume, toxicity and mobility of the volatile and semi-volatile organics present in the unsaturated and saturated zone soil matrix. Restoration of the aquifer to a 1×10^{-5} risk level will permit the groundwater on-site to be used for drinking water purposes in the future. Furthermore, cleanup of the groundwater to the target level will eliminate the threat posed to public health and the environment from the future extent of contaminant migration in groundwater and surface water.

The selected groundwater remediation alternative, on-site air stripping followed by activated carbon adsorption, is more costly than air stripping alone. However air stripping alone to the target cleanup levels and will not remove semi-volatile organic contamination. Therefore during the later years of treatment carbon adsorption will be used to assure that cleanup levels are achieved.

The alternative that requires shipment off-site of contaminated groundwater for treatment is much more costly, does not provide greater public health protection, and is of questionable implementability.

In contrast, the no action alternative is not an appropriate remedy. First, such a remedy would be unreliable and not effective in terms of protecting human health considering future uses of the site. Second, such a remedy would be totally ineffective in terms of protecting the environment due to the contribution of contaminants to surface water. Third, such a remedy does not comply with applicable or relevant and appropriate requirements. Finally, the no action alternative does not meet the strong statutory preference for remedies that employ treatment to reduce toxicity, volume or mobility of contaminants.

Based on information contained in the Administrative Record, EPA has determined that the selected remedial action is consistent with section 121 of SARA and utilizes treatment which permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances at the site. Further, the remedial action is protective of human health and the environment, cost-effective and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

C. Evaluation of Selected Remedy vs Other Alternatives

The July 24, 1987 memorandum from the Assistant Administrator for the Office of Solid Waste and Emergency Response entitled "Additional Interim Guidance for FY'87 Record of Decision" establishes nine evaluation criteria which are to be used to explain the rationale for selecting the chosen alternative. Certain of these criteria are mandated by SARA; others derive from the current NCP and existing RI/FS and ROD guidances.

As described earlier, an initial screening of alternatives was conducted using the process contained in the current NCP. This screening was deemed acceptable because SARA requirements are either equal to or more stringent than those in the NCP. Hence, screening on the basis of the current NCP would not eliminate alternatives that would be acceptable under SARA. That screening process resulted in identification of four source control and seven management of migration alternatives. Certain features of these alternatives were then selected for components of the final remedy described earlier. A comparison of the final remedy with these alternatives was conducted, based upon the nine evaluation criteria. The results are as follows:

1. Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, as amended by SARA, requires that remedial actions comply with requirements or standards under federal and state environmental laws. The requirements that must be complied with are those that are applicable or relevant and appropriate to the hazardous substances, pollutants, or contaminants that remain on-site. All of the alternatives, with the exception of those for No Action, will meet all federal and state ARARs.

Each of the thermal processing alternatives evaluated will meet applicable federal and state standards. Each will require on-site test burns to set operational parameters and assess destruction removal efficiencies (DRES). The principal differences among the alternatives are cost and protectiveness associated with treating raw waste and managing hazardous treatment residuals. The selected remedy, onsite thermal destruction, complies with ARARs, is less costly, and is more protective because it does not require shipment of hazardous waste off-site for treatment.

Each of the groundwater treatment alternatives are capable of achieving federal and state standards with the possible exception of off-site treatment. The availability of such a high degree of treatment for such large volumes of water over the long term may not be feasible.

All alternatives, except no action, as well as the selected remedy, may require work in wetlands and areas within 100 feet of wetlands. Adequate steps can be taken to minimize any impacts on the wetlands, and all alternatives include mitigative steps to comply with wetlands requirements.

2. Reduction of Toxicity, Mobility, or Volume

This evaluation criteria relates to the performance of a technology or remedial alternative in terms of eliminating or controlling risks posed by the volume, toxicity or mobility of hazardous substances.

The selected remedy will result in the treatment of 25,000 c.y. of raw waste and soil contaminated primarily with volatile organics. All of the thermal processing alternatives evaluated will reduce the toxicity of the raw waste and contaminated soils to protective levels. The destruction of the organic contaminant would also reduce the concentrations of organics in the soil, thereby decreasing their ability to migrate and contaminate the groundwater. The differences between the processes is cost and potential threat associated with the amount of hazardous material that must be shipped off-site for treatment or disposal. For low temperature thermal processing which involves some off-site treatment and disposal, and offsite commercial incineration, the off-site treatment and disposal increases the cost substantially with no improvement in public health or environmental protection.

The groundwater treatment called for in the selected remedy, as well as in several alternatives evaluated for consideration of management of migration, will significantly reduce the volume of hazardous organic substances in the groundwater.

Each of the alternatives considered will transfer the organic contaminants to a treatment media which will render them less mobile in the environment. The contaminated air stream exiting the air stripping towers will contain volatile organic compounds which will be treated by vapor phase activated carbon. The selected remedy will include air stripping and during the last years of treatment, adsorption of organics on activated carbon will be added to assure the achievement of target levels in groundwater. This remedy will significantly reduce the mobilit of the organic contaminants.

3. Short-Term Effectiveness

Short-term effectiveness measures how well an alternative is expected to perform, the time to achieve performance and the potential adverse impacts of its implementation. The source control component of the selected remedy requires excavation and treatment of 25,000 c.y. of raw waste and contaminated soil. Implementation will require an estimated two years, exclusive of design, bidding and award time. Excavation could result in the release of airborne volatile organics and contaminated fugitive dust. To mitigate this impact, excavation will be controlled using techniques such as sheet piling vertical cuts, and suppressant techniques, such as foam or water spray. Air monitoring will be conducted at the perimeter of the site for volatile organics and particulates.

The management of migration component of the selected remedy consists of Precipitation/Air Stripping/Activated Carbon/Filtration. This component will take an estimated five to ten years to complete. Prior to implementation, however, a full-scale performance test and pilot treatability study will be needed to determine the maximum groundwater pumping and recharge rates and other design criteria. Air, groundwater and surface water monitoring will be required during operation to monitor the effectiveness of the treatment system.

The no action alternatives could be implemented quickly. However the operation and maintenance period for such alternatives through, fencing, grading, seeding, and implementing a long-term monitoring program, would be greater than for other alternatives. Air monitoring would be required during revegetation and grading to ensure that levels do not pose risk to on-site workers and nearby residents. However, this alternative requires monitoring of groundwater for at least 30 years. Reduction of contaminant levels in soils and groundwater to levels protective of human health and the environment by natural attuation may take as long as 60 years.

As indicated for the selected alternative each of the thermal source control alternatives requires excavation of contaminated soils and control of emissions to the ambient atmosphere. Both on and off-site incineration are proven and effective technologies. On-site incineration will take three years to implement while off-site could be accomplished in two years. However, the off-site incineration program could be faced with extensive delays due to the limited commercial incinerator capacity nationwide. Further, off-site incineration will result in greatly increased truck traffic to and from the site. As many as 4,000 18 wheel truckloads of contaminated soil would be transported away from the site and an equal number number of truckloads would be required to deliver clean backfill to the site. Safety measures would be needed to prevent spills on highways and control of traffic on local roads located along the truck route. It is also questionable if the local roads in the vicinity of the site could handle this volume without renovation.

Mobile incineration systems are commercially available, but there may be delays in securing a system due to the current limited capacity in the industry. EPA anticipates increased availability in the future, but availability is unknown at this moment. A test burn would be conducted prior to operation to assure the effectiveness of the selected technology and both stack emissions and ambient air monitoring would be conducted to ensure protection of public health.

The other source control alternatives considered such as on-site and off-site containment in a RCRA Subtitle C landfill are not expected to be effective without additional treatment to reduce the mobility of contaminants. Also the capacity in existing landfills for such large volumes of "low level" waste is not expected to be available.

4. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence addresses the long-term protection and reliability of an alternative.

With the exception of the no action alternative, each of the alternatives, including the selected remedy, should provide equivalent protection of public health and the environment. None of the alternatives result in complete destruction or removal of all waste.

The no action alternative would not be permanent, effective or reliable since contaminants would continue to move from soil into groundwater and into the surrounding environment. The monitoring program would track, but not control, such movement. Fences, warning signs and similar barriers to limit exposure would not prevent exposure due to dermal contact and inhalation of dust and vapor.

Both on-site and off-site Thermal Destruction/Incineration would be effective, permanent and reliable alternatives, because contaminants in the soils would be destroyed. Similarly, all of the groundwater treatment technologies considered would result in effective and permanent removal of contaminants from the groundwater. The air stripping alternative, however, may not be completely effective over the long term in that semi-volatile organic compounds may remain in the groundwater. All groundwater treatment alternatives exhibit the same difficulty with reliability in that all require design of a groundwater extraction system that would result in all contaminants being processed through the treatment train. It is possible that some contaminated groundwater would escape extraction and treatment and remain in the environment. The selected remedy is the most effective because it will capture most organic and inorganic contaminants and remove them from the environment.

5. Implementability

Implementability considerations address how easy or difficult, feasible or infeasible it would be to carry out a given alternative from design through construction and operation and maintenance. The implementability of the alternatives is evaluated in terms of technical and administrative feasibility, and availability of needed hardware and technical services. The alternatives evaluated here are all technically feasible. However, there are some minor implementation problems associated with each of the alternatives.

Off-site Incineration will be dependent upon adequate capacity at a commercial incinerator, and upon the availability of facilities in compliance with all regulatory requirements, as required by Section 121 of SARA and EPA's Offsite Policy. It is expected that treatment of the large volumes of soil involved at the Davis site would require a phased delivery and treatment schedule.

On-site Thermal Destruction would utilize a mobile incineration system. Such systems are now commercially available, and there are no anticipated difficulties in obtaining the appropriate equipment.

The on-site groundwater treatment systems of all of the alternatives use available technology and equipment. However, equipment delivery and pilot testing and startup time will take six months to one year.

The groundwater treatment alternative which calls for disposal of contaminated groundwater at an off-site RCRA facility would be subject to RCRA generator and transportation requirements and in all probability restrictions by the facility on amounts which could be treated. Implementing this alternative would be unlikely due to the large amounts of groundwater requiring treatment.

6. State Acceptance

The Rhode Island Department of Environmental Management (RIDEM has reviewed the various alternatives and has indicated its support for the selected remedy.

7. Community Acceptance

This evaluation criteria addresses the degree to which members of the local community support the remedial alternatives being evaluated.

During the public comment period on EPA's Proposed Plan, a number of commentors (Sierra Club, Town of Smithfield) supported EPA's choice of onsite incineration and groundwater treatment for the site.

The local residents have reservations about potential air emissions from excavation and handling activities and strongly favor stringent air monitoring and the use of mitigative measures to control any unavoidable emissions. The Town of Smithfield also indicated a desire to be involved closely with the design and implementation of the remedy.

8. Cost

Costs are evaluated in terms of remedial action costs and replacement costs.

The present worth cost for the source control component of the selected remedial action is based on treatment of 25,000 c.y. of contaminated soils and raw waste to a level of 2 ppm total volatile organics. EPA estimates that it will take two years to treat this volume by on-site incineration. The estimated present worth cost is $ 14,912,000. Included in this cost estimate is $834,250 present worth cost for an on-site RCRA landfill for disposal of treatment residues.

By comparison, the estimated present worth cost to treat the same volume by off-site incineration, over a two year period, is $75,568,500.

The estimated present worth cost for low temperature treatment of 25,000 c.y. of contaminated soils onsite is $16,098,000. Approximately $6,000,000 of this cost is for the off-site thermal destruction of 2500 c.y. of raw waste which can not be processed by the low temperature unit.

As part of the selected remedy, groundwater would be treated to reduce contaminants to levels associated with a potential excess cancer risk of 1×10^{-5}. The estimated period of time to achieve this level of remediation is five to ten years. The estimated present worth cost of the groundwater remediation component of the selected remedy is $ 10,497,000.

The selected groundwater remediation alternative is more costly than the alternative which employs air stripping alone ($8,890,000). Air stripping alone, however, is not as effective in removing the contaminants from the groundwater. Contaminants in groundwater might necessitate the use of carbon adsorption near the end of the remediation period, to ensure attainment of the target cleanup levels. Transportation and treatment of groundwater at an off-site RCRA facility was the most costly alternative ($15,120,000). In addition, this alternative is unlikely to be feasible.

9. Overall Protection of Human Health and the Environment

Protection of human health and the environment is the central mandate of CERCLA as amended by SARA. Protection is achieved by reducing threats to acceptable levels and taking appropriate action to ensure that, in the future, there will be no unacceptable risks to human health and the environment through any exposure pathways.

All alternatives with the exception of the no action alternative that were carried forward for evaluation provide protection of human health and the environment. However, the selected remedy, excavation and on-site Incineration of 25,000 c.y. of contaminated soils and remediation of groundwater to an excess cancer risk of 1×10^{-5}, provides the adequate degree of protection of human health and the environment.

The principal difference in the thermal processing alternatives is that off-site incineration and on-site low temperature thermal processing require shipping off-site large quantities of raw waste (2500 cy.) and contaminated soil (25,000 cy). Not only does this make these options more costly than on-site incineration, it also increases the opportunity for off-site exposure, therefore implementability of these off-site options is less desireable.

The selected groundwater treatment process represents the best demonstrated available technology for the treatment of the contaminants at the Davis site. Pilot studies will be conducted prior to implementation of the remedy to determine the appropriate design of the unit processes that will be necessary to remediate groundwater. Treatment of groundwater will permenantly and significantly reduce the volume, toxicity and mobility of the volatile organics in the groundwater as well as reduce the mobility of organics present in the unsaturated zone soil.

The alternative that used air stripping alone as treatment is estimated not to be as effective as the alternative that uses air stripping and carbon adsorption in that it would not remove organics from the groundwater to achieve the cleanup level. Therefore this alternative was judged to be less protective than the selected remedy. In addition to being of questionable feasibility, the alternative that requires collection, transportation and treatment of groundwater at an off-site RCRA facility increases the risk to exposure due to increased opportunities for releases to the environment during trasportation.

10. Conclusion

Based on information available in the Administrative Record and the evaluation of the alternatives against the statutory requirements of SARA, the NCP, and the nine criteria, EPA has concluded that the selected remedy is protective of human health, attains all applicable or relevant and appropriate requirements, and is cost-effective. This remedy also satisfies SARA's preference for remedies which employ treatment as their principal element to reduce the volume, toxicity or mobility of hazardous substances at the site.

Although this remedy will require measures to control possible risks related to its construction and operation, the Agency's analysis indicates that all of these risks can be satisfactorily controlled. Additionally, any short-term risks appear heavily outweighed by the long-term effectiveness and permanence this remedy will provide. The Agency believes this remedy will result in a permanent solution to protect the public health and environment resulting from the contamination of the site and utilizes alternative treatment technologies to the maximum extent practicable.

VII State Role

The role of the State of Rhode Island in this federal lead site is multiple. The State reviews documents to determine if they are in compliance with applicable or relevant and appropriate state environmental laws and regulations and provides comments on all EPA funded studies at the site.

The State of Rhode Island concurs with the selected remedy for the Davis Liquid Waste site located in Smithfield, Rhode Island. A copy of the declaration of concurrence is in Appendix D.

The State of Rhode Island will provide 10% of the capital costs of the selected remedy and 10% of the operation and maintenance costs throughout the implementation of the remedy.

VIII. APPENDICIES

Appendix A	Davis Liquid waste Site Final Responsiveness Summary
Appendix B	Davis Liquid Waste Site Responsiveness Summary, Waterline
Appendix C	Administrative Record Index
Appendix D	State Concurrence Letter

Appendix A

Davis Liquid Waste Site

Final Responsiveness Summary

FINAL RESPONSIVENESS SUMMARY

Davis Liquid Superfund Site
Smithfield, Rhode Island

EPA Work Assignment No.: 200-1L17
REM II Document Control No.: 117-CR3-OP-FBVU-1

PREPARED FOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I
BOSTON, MASSACHUSETTS

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Preface

The U.S. Environmental Protection Agency (EPA) recently held a public comment period for interested parties to comment on EPA's July 1987 draft Feasibility Study (FS) and preferred alternative for the Davis Liquid Superfund site. The FS examines and evaluates various options called remedial alternatives, for addressing contamination at the site. At the time of the public comment period, EPA had announced its preferred remedy for the cleanup of the Davis Liquid site.

The purpose of this responsiveness summary is to document EPA responses to the comments and questions raised during the public comment period. All of the comments summarized in this document will be factored into EPA's selection of a final remedial alternative for the Davis Liquid site.

This responsiveness summary is divided into the following sections:

I. Responsiveness Summary Overview - This section briefly outlines the proposed remedial alternatives as presented in the draft FS, including the preferred alternative, and provides a general overview of public comments on the alternatives.

II. Background on Community Involvement and Concerns - This section provides a brief history of community interests and concerns regarding the Davis Liquid site.

III. Summary of Comments Recieved During the Public Comment Period and EPA Responses to These Comments - This section summarizes both written and oral comments received from the public during the public comment period and provides EPA responses to them. These comments are organized by subject area.

IV. Remaining Concerns - This section describes concerns that were not directly addressed during the RI/FS. EPA needs to address these concerns during the design and implementation of the remedial alternative.

Attachment A - This attachment includes a list of the community relations activities conducted at the Davis Liquid site during EPA's remedial site program.

I. RESPONSIVENESS SUMMARY OVERVIEW

A. Proposed Alternatives and Preferred Alternative

The draft FS identifies and evaluates several remedial alternatives that are judged by EPA to be the most effective for dealing with contamination at the Davis Liquid site. The remedial alternatives are organized into two categories: source control and management of migration. The purpose of source control remedial alternatives is to address contaminated soils and raw wastes. The draft FS for the Davis Liquid site evaluated four source control alternatives. These were:

(1) no action
(2) on-site low temperature thermal treatment
(3) on-site high temperature thermal destruction
(4) off-site high temperature thermal destruction

In addition, the FS evaluated six alternatives for addressing contaminated ground water, surface water and sediments (i.e., management of migration.) These were:

(5) no action ground water
(6) no action surface water
(7) no action sediments
(8) on-site treatment of ground water
(9) combined treatment of surface water with ground water
(10) dredge and treat off-site sediments

EPA's preferred alternative is a combination of source control alternative #3 and management of migration alternatives #7, #8, and #9. On-site high temperature thermal destruction (#3) will entail excavating contaminated soils and wastes for treatment in an incinerator that will operate on site for approximately three years. No action sediments (#7) will entail a thirty-year program to monitor nearby Latham Brook for the presence of contaminated sediments. On-site treatment of ground water (#8) will entail continually pumping, treating, and recharging ground water until cleanup standards are attained (approximately ten years). Combined treatment of surface water with ground water (#9) will entail treating water from an on-site stream in the ground water treatment facility.

B. Public Comments on the Remedial Alternatives

Three parties submitted both formal oral and written comments to EPA during the public comment period: the Rhode Island Department of Environmental Management (RIDEM), the Rhode Island Sierra Club, and the Smithfield Town Council. The Oxford Tire Recycling, Inc. submitted a formal written comment and one citizen submitted oral comments during the public hearing. In addition to the formal comments, many questions and concerns were raised at the August 6, 1987 public hearing during the question-and-answer period that followed the submission of the formal oral comments.

In general, those commenters that submitted formal written and/or oral comments supported EPA's preferred alternative for the Davis Liquid site. However, most commenters had major concerns regarding the safety of air emissions from the incineration process. In addition, a few citizens at the public hearing and at the public informational meeting that was held prior to the public comment period, expressed concern that the excavation and incineration of contaminated soils and wastes might pose more serious risks than alternatives such as capping or no action that would leave the soils and wastes undisturbed. Commenters were very interested in having an opportunity to comment on the design of the incinerator. Commenters were also interested in how EPA would monitor emissions from incineration as well as from the excavation of soils. The Smithfield Town Council and citizens at the public hearing were very concerned that the tire pile at the site may harbor more hazardous wastes than have yet been detected, and in addition, may be a potential fire hazard. Citizens of Smithfield and the Rhode Island Sierra Club requested that EPA facilitate increased public participation of Town members.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Ground water and surface water contamination and the potential health effects from this contamination have been the principle concerns of the community surrounding the Davis Liquid site for more than ten years. The possibility of a second tire fire and delays in cleanup have also been concerns. Recent concerns center on the safety of the proposed incineration process, and the emissions resulting from its operation.

The Davis Liquid site was used as a disposal site for various hazardous liquid and solid wastes during the 1970s. Drummed wastes and bulk liquid wastes from tank trunks were dumped into unlined pits and lagoons at the site. Residents first became aware of extensive truck activity at the Davis property in the mid-1970s and neighbors complained to local and State officials of acid chemical smells emanating from the property. A tire fire at the site in 1977 and a subsequent investigation into the cause of the fire prompted a group of approximately six to eight residents to bring their concerns to the attention of the Smithfield Town Council. Anxious to expedite site activities and dissatisfied by an apparent lack of response, this group of residents approached the Conservation Law Foundation of Rhode Island for assistance. In 1978, they were successful in obtaining a court order barring further hazardous waste disposal at the site. However, the 1978 court order did not prohibit the disposal of non-hazardous wastes at the Davis Liquid site and a core group of active citizens, using the name "Dump the Dump", lobbied the Smithfield Town Council for closure of the site and closure of the nearby GSR landfill. They also initiated legal and investigative actions against Mr. Davis, the site owner.

Beginning in 1978, State efforts to gain access and investigate the Davis Liquid site were met with a series of legal challenges by Mr. Davis which resulted in long delays in addressing possible contamination problems at the site. (Off-site sampling had revealed the presence of organic chemicals in off-site surface water). Citizens of Smithfield became frustrated due to these long delays, and legal challenges by Mr. Davis.

In 1980, RIDEM received Rhode Island Superior Court permission to conduct a full-scale ground-water contamination study involving drilling and sampling of wells on the Davis property. Chemical contaminants were found in both ground water wells and surface water adjacent to the Davis Liquid site. However, further delays in the study of the site resulted from lack of cooperation from Mr. Davis, and citizen activity dwindled between 1980 and 1983. By January of 1983, the site was placed on the EPA's National Priorities List, making it eligible for federal funds under Superfund and EPA began the RI/FS in October of 1984, after preliminary work was conducted by RIDEM. During the winter of 1985, EPA removed over 250 drums containing hazardous waste. In November of 1986, EPA completed the RI which assessed the contamination in soils and waste materials, ground water, surface water, and air at and around the site.

In the past several years, citizens' concerns have focused on EPA's findings of low levels of contamination in 23 residential wells near the site.

Contaminants were detected in several of these wells at concentrations above EPA health and safety criteria for drinking water. Since discovery of this contamination, RIDEM has supplied bottled water to those residents whose wells have shown contaminant levels above EPA criteria. Residents who are not being supplied with bottled water continue to fear that their wells may become contaminated and are hopeful that EPA will approve the installation of a permanent water supply to serve the area around the site. Residents also remain very concerned about potential health effects stemming from the contamination at the site. There have been a number of cancer cases among residents living immediately around the site, and residents feel that this is a result of the contamination at the site. Since completion of EPA's draft FS, residents near the site are currently focusing their concern on the safety of the proposed incineration process and the emissions that will result from its operation.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS

This responsiveness summary addresses both oral and written comments received by EPA concerning the draft FS for the Davis Liquid Superfund site. The comment period was held from July 22, 1987 to August 11, 1987 and was extended to August 17, 1987 at the request of several commenters. EPA held a public hearing at the Smithfield Town Hall on August 6, 1987 as an opportunity for the public and other interested parties to present oral comments to EPA and ask questions of Agency staff. Formal oral comments and the question-and-answer period that followed are recorded in a transcript of the hearing. Copies of the hearing transcript are available at the information repositories located at the East Smithfield Public Library, the Greenville Public Library, and at the EPA Region I office in Boston, Massachusetts. EPA also received four written comments on the FS. The written and oral comments are summarized and organized into the following categories: (A) remedial alternatives, (B) public participation and availability of information, and (C) miscellaneous. EPA responses are provided for each comment, or set of like comments.

A. REMEDIAL ALTERNATIVES

Specific comments regarding the various alternatives discussed in the draft FS are summarized below. They are organized in the following sections: (1) remedial alternative preferences, and (2) technical concerns regarding remedial alternatives.

1. Remedial Alternative Preferences

a. Comment:

One commenter (The Sierra Club) had objections to several of the source control alternatives. It felt that the no action alternative (SC-1) would not be acceptable because, if the toxic materials at the Davis Liquid site were to be left in place, the ground water quality would surely deteriorate. The commenter also objected to low-temperature destruction (SC-2) because it would be more costly and less effective than high temperature treatment. The commenter objected to off-site high temperature thermal destruction (SC-8) because it is very costly, and because of the danger of transporting toxic materials. In addition, the commenter objected to the no-action alternatives (GW-1, SW-1) for management of migration. It commented that these alternatives do not provide acceptable protection from the toxic materials at the Davis Liquid site. The commenter favors treatment of ground and surface water at the site (GW-2, SW-2) and noted that these techniques have proven effective at many other sites. The commenter disagrees with EPA's assessment that the best solution to sediment contamination in Latham Brook is to take no action (SD-1). It urged that EPA should consider the possible adverse effects on wildlife as well as on human health. It also suggested that if no cleanup action such as dredging (SC-2) is planned, then at the very least the location and toxicity of the sediments should be monitored.

EPA Response:

EPA agrees with the commenter that high temperature incineration, along with ground and surface water treatment would be the most effective alternative. With respect to sediments, EPA believes that movement and re-suspension of the sediment is potentially more harmful than leaving the sediment undisturbed. None of the data collected indicates releases from sediment that would be harmful. EPA will consider a monitoring program to supplement the existing data.

b. Comment:

The Rhode Island Department of Environmental Management (RIDEM) urged that the proposed on-site RCRA landfill be replaced by an off-site disposal option.

EPA Response:

EPA considered and evaluated this option during the FS by comparing on-site land disposal for treatment residuals to off-site land disposal. An on-site landfill was chosen based on the criteria of cost-effectiveness and feasibility. At the estimated volume which would require disposal (approximately 15,000 cubic yards), the cost of on-site disposal is estimated to be less than off-site disposal. Also, the feasibility of finding a permitted landfill that would be willing to accept a large quantity of residual wastes is becoming both more difficult and more expensive.

c. Comment:

One citizen asked why EPA did not choose simply to cap the site, divert Latham Brook into a treatment facility, and treat the sediments in Latham Brook.

EPA Response:

This is a technically feasible option except Congress made it very clear when it amended the Superfund statute that EPA should attempt to destroy and treat hazardous waste at the site, rather than contain the contamination source. Therefore, EPA prefers to incinerate the source soils present at the site instead of cap them. EPA's preferred alternative will remove the source of contamination, and then treat the residual contamination present in the ground water. This will greatly reduce the volume and toxicity of hazardous wastes. Remaining waste that can be treated no further will be kept on site in a tightly controlled landfill. The goal of this approach is to minimize the of future problems at the site.

2. Technical Concerns Regarding Remedial Alternatives

a. Air Emissions from Soil Excavation and Incineration

1. Comment:

One citizen asked what action EPA would take if a pressurized drum were to break open during excavation.

EPA Response:

The procedures for dealing with this kind of situation will be spelled out in the health and safety plans that will be developed for the site before remedial action occurs. The plan will specify the proper equipment which should be on site for dealing with potential problems, and will contain information regarding the location of the nearest hospital in case of injuries to workers on site. If EPA found that proper procedures were not being followed, then those responsible for the work would be replaced.

2. Comment:

Citizens were very concerned about the health effects of air emissions from soil excavation. They expressed concern that contaminants would be released into the air from excavation and that EPA would not be able to stop excavation in time to prevent off-site migration of the contaminants. They asked what measures would be taken to ensure that excavation does not become a health hazard.

EPA Response:

EPA will conduct continuous air monitoring at the point of excavation and at the site perimeter. If the action level of a compound is exceeded during excavation, excavation will stop and the hole will be covered up. EPA will use commercially available dust suppressants, such as 3M foam or equivalent materials that have been used successfully at numerous RCRA permitted landfills, and work in a controlled manner. The material that is temporarily stockpiled before incineration will be kept covered with a tarp to reduce volatilization of organics.

3. Comment:

One citizen argued that criteria for emissions from incineration should be based on health effects rather than on a technical performance standard such as the "six-nine" destruction removal efficiency.

EPA Response

The "six-nine" destruction removal effeciency is a minimum performance standard which emissions are required to meet at the point of stack exit if PCBs are present in source areas. At the Davis site, a "four-nine", or 99.99%, destruction removal efficiency is required since PCBs are not present in source areas. Health-based criteria are used in assessing risks posed to receptors located at ground level and at specified distances from the stack. EPA will ensure that the incinerator is designed and operated such that both the required technical performance standards and health-based criteria are met. This can be accomplished by establishing various design and operational criteria, such as altering stack dimensions (e.g., height), blending material as it enters the incinerator, or limiting the amount of soil loaded into the incinerator at one time.

At the Davis site, EPA's principal concern is metal emissions. Metals are not destroyed in the incineration process and therefore are not included when discussing the "six-nine" destruction removal efficiency. Particulate controls will be employed to remove metals from the exhaust gases.

4. Comment:

The Sierra Club commented that a thorough program to monitor emissions from the incineration process is essential because of the variability of the materials at the site, coupled with the presence of both organic materials and metals. It expressed discomfort with EPA's assertion that metals in the emissions would be safely diluted within 1/5 mile. It does not believe that this system will always dilute metal oxides sufficiently given unusual weather conditions or local air circulation problems. A citizen asked if additional monitoring points could be set up at people's homes.

EPA Response:

EPA conducted an emissions analysis that took into account a full range of atmospheric conditions and included both metal and organic materials regulated by the State of Rhode Island. Assuming a 40-foot stack height, the analysis showed that maximum ground level concentrations during worst-case atmospheric conditions would be located a distance of 0.261 kilometers (approximately 1/5 mile) from the stack. For this scenario, none of the health-based acceptable ambient levels proposed by the State of Rhode Island were exceeded. However, an important factor which has not yet been introduced to the emissions analysis is the actual variation in the site terrain. A more detailed analysis to determine the effect of the site terrain will be required during remedial design.

Although the public has expressed the desire for air monitoring to be conducted at nearby residences, EPA does not believe that this is a cost-effective method for monitoring the incineration process. Instead of monitoring at residences, EPA will monitor stack emissions directly. Additional dispersion modeling during design will determine what emission limits must be established in order to assure that the health-based ambient air quality criteria are not exceeded. Stack and combustion monitoring will be conducted to assure that incinerator emissions do not exceed these limits.

5. Comment:

A citizen asked if air monitoring would involve constant monitoring for the individual compounds on EPA's Hazardous Substance List, or whether it would monitor for total compounds present. The citizen asked whether the portable G.C. is operated by a person.

EPA Response:

A comprehensive air monitoring program will be conducted at the site during operation of the incinerator. This will include continuous monitoring at the stack exit, point of excavation, and at the site perimeter. At the stack exit, the destruction removal efficiency (DRE) will be monitored based on the concentrations of a few designated compounds which are known to be prevalent at the site and are the most difficult to destroy. During the test burn EPA or its contractor will test emissions for all compounds on the Hazardous Substance List to confirm that, when the designated compounds are destroyed, all the other compounds are also destroyed.

Monitoring at the point of excavation will be conducted using hand-held instruments that register total organic compounds present. Monitoring at the site perimeters can be a combination of sampling for total organic compounds present and all Hazardous Substance List compounds. A portable GC is a piece of laboratory equipment which is used to analyze samples. It is generally housed within the on-site trailer and it can be run by one person.

6. Comment:

A citizen was concerned how EPA would decide when to shut down the incinerator or stop excavation, i.e. what concentrations of what chemicals would constitute a limit at which the system would be shut down.

EPA Response:

The concentrations of specific compounds that would trigger an incinerator shut down or a stoppage of excavation will be determined during remedial design. These concentrations are referred to as action levels.

7. Comment:

One citizen was concerned about possible air emissions during the test burn. He noted that since combustion characteristics are not yet known, wastes may only semi-incinerate, and may pass through the carbon filtration and become airborne.

EPA Response:

A test burn is conducted very gradually, beginning with very small loads, in order to determine the rate at which soil can be added to the incinerator. There are a dozen control points throughout the process which are monitored, and if one of these indicates a problem, the system can be shut down. A secondary combustion chamber will destroy organic material which has been volatilized from the soil in the primary chamber. The scrubber and particulate filter will remove additional materials. If a mechanical or human error were to occur during the incineration process, the system could be shut down at any time. If a release were to occur, the amount that could be released and dispersed throughout the environment would be limited to the amount of material present in the combustion chambers.

b. Design

1. Comment:

Several commenters were concerned about the design phase of the incineration process. RIDEM and the Smithfield Town Council both argued that the preferred alternative should be designed to meet all applicable State and local standards. In addition, the Department would like the system to be designed with the goal of obtaining treatment levels in the shortest time possible, not to exceed ten years.

EPA Response:

EPA has provided information to the Town of Smithfield on the types of incinerators that are being used today at various sites, and the kind of material these incinerators have been burning. The exact specifications of the design which will be implemented at the Davis Liquid site will depend on the information gathered during the test burn. The system will be designed to achieve all applicable, relevant, and appropriate Federal and State technical and health-based emission standards and criteria. Local standards and requirements will be considered for relevance and appropriateness. Once the incinerator becomes operational, it is expected to operate for two years to treat soils to protective levels.

c. Tire Pile

1. Comment:

The Smithfield Town Council noted that residents who have been following the site situation consistently know from maps and other sources that Mr. Davis has altered the location of the tire pile, waste pits, and access roads. The Town believes that EPA studies substantiate the fact that drums and hazardous materials have been found underneath some of the tires, and is concerned that hazardous wastes are present underneath more of the tires. The Town also expressed concern about the health effects of the mosquitoes and insects that breed in the tires.

EPA Response:

The tires west of the unnamed stream which runs through the site will be moved in order to facilitate the cleanup operation. Any water or run-off from the tires will be contained on site. When the tires are moved from this area, EPA will conduct additional analytical testing on the newly exposed soils and will treat the area as appropriate. EPA has found no contamination in the part of the tire pile east of the unnamed stream (outside the wetland), and tires in this area are not scheduled to be moved. EPA believes that it has been able to delineate the outer extent of contamination in the tire pile using aerial photos. However, if further contamination is found within unsuspected tire pile areas, EPA will re-evaluate the scope of the remedial action to see if cleanup of these areas can be included in the proposed action.

EPA expects to find some contamination of the tires which are buried in contaminated soils. Tires that are within soil-contaminated regions will be incinerated or decontaminated by washing with water to remove soil. However, EPA does not own the tires, and has authority only to relocate the tires out of the wetland and staging areas to a location of Mr. Davis' choosing, so that the remedy may be conducted. The health effects of mosquitoes which may breed within the tire pile if not within the scope of EPA's site evaluation. This concern should be directed to the appropriate public health agencies.

2. Comment:

One citizen was very concerned about the possibility of the incinerator exploding, emitting contaminants into the air, and causing a fire in the tire pile. This resident was very concerned that the Town of Smithfield and the section of the state in which it is located would not have the capabilities to contain a tire fire, if it began.

EPA Response:

The chances of a failure within the mobile incinerator system that would result in an explosion and fire outside of the chambers are practically non-existent. An explosion could only be caused by loading a large quantity of highly volatile liquid (such as gasoline or benzene) into the incinerator. Drums of liquid waste are never loaded into an incinerator. Instead, drums are opened, the contents are analyzed, and then the material is slowly fed into the incinerator. In generaI, the material that will be incinerated is soil contaminated with low levels of organic compounds. There are insufficient quantities of organics present in the soil in concentrated form to cause any explosions.

However, if the incinerator were to explode, a danger may exist if the incinerator was located in close proximity to the tire pile, since it could catch on fire. The incinerator will not begin operation until the tires are moved. Also, under the authority of Superfund, EPA has set up the Emergency Response Operation which is a specially trained group that can respond immediately to emergency situations such as a fire.

3. Comment:

The Smithfield Town Council believes that the Remedial Investigatio (RI) minimizes the threat of the tire pile, and urged that the FS be expanded to include removal of the tires, and treating and capping the area.

EPA Response:

Tires are categorized as a non-hazardous waste. Since EPA neither owns the tires nor has the authority to regulate tires under Superfund, EPA cannot remove the tires from the site unless given permission to do so by Mr. Davis. EPA does have the authority to move tires out of wetland and staging areas to allow the remedy to be conducted.

4. Comment:

The Town was concerned that rain may cause contaminants in the tire pile to flow over the site after it has been cleaned up, causing recontamination of the site.

EPA Response:

Tires will be removed from the site treatment areas and will not be replaced in those areas. The surface water and ground water in the contaminated areas will be isolated from other parts of the site by the treatment system. Any contaminated ground or surface water that enters the treatment zone will pass through the treatment system and will not leave the treatment zone until cleanup standards are acheived.

EPA believes that there are no contaminants in the tires themselves. After the remediation of soil, ground water and surface water is completed, no contamination levels above the health criteria will be left to recontaminate the site.

d. Off-site Wastes

1. Comment:

Several commenters requested that only contaminants from the site be treated, incinerated, or buried at the site. The Smithfield Town Council also requested that, when EPA remediates the GSR landfill, only on-site contaminants be placed in the GSR landfill.

EPA Response:

Under the Superfund program, EPA is not required to obtain a RCRA permit to store, treat, or dispose of hazardous wastes that originate from the site being remediated. EPA could manage wastes that originated from another site only if it had a RCRA permit, and it would be contrary to EPA policy to request a permit in order to operate a hazardous waste treatment facility.

2. Comment:

The Smithfield Town Council urged that the Gloucester-Smithfield Regional (GSR) landfill be treated as part of the Davis Liquid site, and be included in the EPA cleanup. It argued that the GSR landfill has the same owner, and possibly the same type of toxins. The Town also noted that it foresees delays in cleanup efforts at the GSR landfill. For these reasons, as well as the cost-effectiveness of solving two problems simultaneously, the Town requests that both sites be treated as one.

EPA Response:

It is not clear that it would be cost-effective, or that it would be efficient to postpone a site specific remedy at the Davis Liquid site in order to conduct studies at GSR to determine if the problems can be dealt with together; nor is there any reason to believe that a cleanup at the Davis Liquid site would in any way delay action at the GSR site.

e. RCRA Landfill

1. Comment:

One citizen asked what responsibilities EPA has at the Davis Liquid site after the 30-year monitoring period for the on-site RCRA landfill is complete.

EPA Response:

The statute requires that for 30 years following completion of the remedial action, EPA must review the status of remedial actions (in which waste is left on site) in five year intervals. The effectiveness of the technology must be assessed in relation to new technologies that might be more effective at the site. However, after thirty years, the site becomes the complete responsibility of the State.

f. Residential Wells

1. Comment:

One citizen was concerned that residential wells could counter the effects of the ground-water extraction wells that will be installed by EPA during the remedial action, and that the residential wells might draw in contaminated water as a result.

EPA Response:

Residential wells are too distant and do not pump sufficient quantities of water to affect the ground-water extraction operation. The quality of water in the residential wells will not be affected by the ground water extraction process.

2. Comment:

One citizen questioned whether the installation of individual carbon filters at affected residences would be more efficient than installing water lines through the entire area.

EPA Response:

Targeting specific homes in the area for installation of carbon filters would not sufficiently protect residents in the area because the nature of the fractured bedrock in the region creates a large diversity in residential well contamination around the site. In addition, individual home systems are generally operation and maintenance intensive.

g. Miscellaneous Questions

1. Comment:

The Sierra Club argued that all incineration operations be conducted during the times when local residents would have normal access to Federal, State and local health officials. Therefore, incineration during weekends, holidays and at night should be prohibited.

EPA Response:

Incineration is a 24-hour-a-day operation. This is due to the 1-to-3 day fire-up time required to bring the incinerator up to its proper operating temperature. Also, since the mobile unit and equipment is very expensive, it is essential for cost reasons to operate it 24 hours a day. Due to public concern, EPA will make an EPA, state, or local police or fire department official available 24 hours a day should the public need to contact someone. Prior to operation, EPA representatives will meet with state and local police and fire officials to establish procedures for local residents to report any operational abnormalities.

2. Comment:

Several citizens expressed concern about odors and noise from the incineration and excavation process.

EPA Response:

The odors from the incineration process should be minimal. There will be a significant amount of noise caused by the incinerator, which will be approximately equivalent to that of a construction site.

3. Comment:

One commenter asked how often the incinerator would be inspected.

EPA Response:

Commercially regulated hazardous waste incinerators are inspected by EPA at least twice a year. At Superfund sites, EPA or the State inspects incinerators at least twice a year. In addition, the incineration process will be monitored continuously while it is in operation by a qualified representative of EPA (i.e., an EPA employee, State employee, contractor, consultant or U.S. Army Corps of Engineer official).

4. Comment:

One commenter asked why EPA had not constructed a slurry wall around the contaminated waste.

EPA Response:

Due to the site's hydrogeological features, this method cannot be used because a slurry wall could not be constructed deep enough to prevent contaminated ground water from moving off site.

5. Comment:

RIDEM encouraged EPA to take into consideration the fact that there exists a State Supreme Court judgement against the Davis's requiring the restoration of the wetlands at the site. The Department argued that the proposed remedy should be selected and designed to allow the State to proceed with actions to completely restore all wetlands at the site.

EPA Response:

Where EPA Superfund remedies do not impact wetlands directly EPA cannot expend Superfund monies to restore wetlands. However, EPA is currently investigating the legal aspects of a mutual agreement with the state to allow for restoration of the wetlands to proceed simultaneously with the remedial action.

B. PUBLIC PARTICIPATION AND AVAILABILITY OF INFORMATION

1. Comment:

The Sierra Club urged EPA to give a group of interested local citizens the opportunity and financial support to conduct an air sampling and testing program either independently or alongside EPA's contractor. The commenter stated that such a program would give local residents the ability to analyze representative sets of air samples at an independent laboratory of their choosing. The Sierra Club commented that residents would benefit by such a program because they could be sure the test results and monitoring program were valid, and that EPA would benefit by such a program because it would lend credibility to the air monitoring data and would engender trust among local residents.

EPA Response:

Local citizens that are interested in reviewing data collected by EPA and its contractors are encouraged to do so. EPA and local citizens can work out an arrangement for public review of this data. For example, EPA may be able to provide data at one of the information repositories at two-week intervals during the remedial action. It should be noted that all air monitoring data will be collected and analyzed according to standard operating procedures established by EPA for the generation of high-quality, reproducible data.

If interested local citizens feel that they need assistance in interpreting data collected during the remedial action they may apply for a technical assistance grant under Section 117e of the new Superfund law. Under this provision, groups of individuals which may be affected by a release from a Superfund site are eligible to apply for a grant from EPA to obtain expert assistance in interpreting technical information regarding the nature of the hazard at the site, the RI/FS, the Record of Decision, the remedial design and remedial action, and other Superfund activities. Applicants must meet the requirements of grant regulations in 40 CFR Part 30 and procurement regulations under 40 CFR Part 33.

2. Comment:

Members of the Smithfield Town Council expressed concern that greater town and public participation be permitted by EPA in the future. The Town Council felt that they could have had greater input into the plan for remediation. The Council further argued that the public should be given the opportunity to comment on the design of the remedial action, specifically the design of the incinerator.

EPA Response:

After deciding which incineration system seems most promising, EPA will conduct a test burn to determine whether the system is capable of meeting health and safety criteria. The data collected during the test burn will be available for public review. In addition, EPA will hold a public meeting on the design of the remedial action. However, this meeting will not be held until the remedial design is near completion. If town officials and local citizens desire greater input into the remedial design process, they may wish to form a citizen's advisory committee that would meet periodically with EPA to discuss specific aspects of the remedial design and remedial action. Also, at the town's request, EPA can brief town officials on the status of the remedial design during Board of Selectmen or Town Council meetings, or other town meetings.

3. Comment:

Citizens of Smithfield urged that EPA fund a town representative that would have access to the site at all times, and would be responsible for notifying Smithfield residents in the event of an emergency during the remedial action. The Town requested that the trial burn results as well as the monitoring results be made available to this representative as soon as they are generated. The Town argued that insurance provided to EPA personnel could also be provided for this person.

EPA Response:

EPA does not feel that it is necessary to provide funding for a town representative that would have access to the site at all times and that would be responsible to the town during an emergency. EPA will develop a thorough site-specific health and safety plan before any work on the site commences. This plan will designate the people responsible in case of an emergency and will spell out exactly how EPA will coordinate with the local fire and police departments and the hospital in case of an emergency. EPA will insure that a responsible official, either from EPA itself, from the Army Corps of Engineers, from a consulting-engineering firm, or from the State, has responsibility for the cleanup operation. Furthermore, an EPA spokesperson will be present at all times during the remedial action.

4. Comment:

One citizen was very concerned that he receive a copy of the tape recording that EPA had made at the hearing before he submitted his written comments.

EPA Response:

The transcript of the hearing requires ten to eleven days to prepare and thus will not be ready for use by the commenter before the comment period deadline. However, the transcript is made essentially for use by EPA. EPA needs the transcript in order to consider and respond to all comments in making its final decision on the remedial alternatives. Copies of the typed transcript will be placed in the information respositories for the benefit of the public as soon as they become available, but copies of the tape will not be made available.

5. Comment:

One commenter asked whether and how often air monitoring test data would be available to the public.

EPA Response:

Test data will be available to the public roughly every two weeks.

C. MISCELLANEOUS ISSUES

1. Health and Safety Issues

a. Comment:

One citizen commented that there appears to be a high incidence of fatalities and malignant tumors in residents living within a one-mile radius of the site. He wondered whether EPA had done any health studies linking the Davis Liquid site with these malignancies and fatalities.

EPA Response:

EPA's mandate under the Superfund program is to clean up hazardous wastes at the site, regardless of whether or not a link can be established between site conditions and health and problems in the site community. Therefore, EPA does not usually conduct epidemiological studies at Superfund sites.

b. Comment:

One citizen asked whether the family living on the site should be wearing protective clothing similar to the EPA officials working on site. He asked what kind of recommendations EPA would make to these people to protect themselves.

EPA Response:

EPA will conduct the remedial action such that it does not pose a health risk to the family living on the site.

2. Compensation

a. Comment:

One citizen asked whether EPA would compensate the area residents, or purchase the land around the site.

EPA Response:

EPA would only buy people's property and relocate them to a new area if there was no other alternative which would allow EPA to protect people's health. EPA is satisfied that the different alternatives that have been considered for the Davis Liquid site will allow EPA to clean up the site and ensure that public health is adequately protected.

3. Schedule of Cleanup and Availability of Funds for Cleanup

a. Comment:

One citizen asked when the cleanup would begin.

EPA Response:

EPA plans to make a final decision regarding the preferred alternative for the Davis Liquid site before September 30, 1987. EPA is hopeful that the design work will be sustantially completed over the winter, and the initial stages of operation will begin by the Summer of 1988.

b. Comment:

One citizen was concerned whether EPA will definitely complete the cleanup, or whether the completion of the cleanup will depend on Congress for yearly funds. The citizen asked whether, if an emergency situation were to develop at another site, funds could be taken out of the budget for the Davis Liquid site for use at that site.

EPA Response:

Congress has allocated funds for the Superfund program through 1991. These funds are obligated on a site-specific basis each year. EPA Region I will submit yearly requests to EPA Headquarters for funds to clean up the Davis Liquid site. However, the ground-water treatment process will require approximately ten years to complete and it is conceivable, although not probable, that Congress would not appropriate more funds for the Superfund program after 1991.

c. Comment:

One resident asked if EPA action would be dependent on the number of people living in the area, i.e., would EPA delay cleanup at the Davis Liquid site because fewer families are affected than at another site.

EPA Response:

Once the Record of Desicision (ROD) has been signed, EPA is required to ensure that the site is cleaned up according to the remedial action plan specified in the ROD.

4. Extension of Comment Period

a. Comment:

The Smithfield Town Council requested that the comment period be extended so that it could review a report by the engineer hired by the town to study EPA's recommendations for the remediation of the Davis Liquid site.

EPA Response:

In response to the commenter's request, the comment period was extended from August 11, 1987 to August 17, 1987.

5. Tire Recycling

a. Comment:

One commenter (Oxford Tire Recycling, Inc.) noted that it is in the process of developing a waste tire management network to serve much of New England. As currently planned, the network will consist of one or more state-of-the-art tire-to-energy facilities and, in addition, several regional tire recycling and processing centers. The commenter noted that it owns an option to take control of the tires at the Davis Liquid site, manage them, and utilize them for purposes of recycling or energy recovery. It might also establish a tire shredding and recycling operation at the site to accept and process used tires not currently on the site. The commenter is concerned that the FS does not take into consideration its proposed plan and the significant environmental benefits of the plan. It requested that EPA give full consideration to the measures that would be needed to preserve sufficient access to the tire pile for its proposed plan for the tires. In addition, it requested that EPA state that the bulk of the tire pile does not contain contamination, and the use of such tires would not raise Superfund or related liability issues.

EPA Response:

The tires are a non-hazardous waste and therefore EPA does not have authority to regulate them under Superfund. EPA acknowledges that there are benefits to a plan that would utilize the tires for the purposes of recycling or energy recovery. EPA does not plan to block access roads during the remedial action. Also, EPA believes that the bulk of the tires do not contain hazardous waste contamination.

b. Comment:

The Town asked whether any companies were interested in purchasing the tires; and if an agreement had been reached.

EPA Response:

Because the tires are a non-hazardous waste, EPA has no authority to regulate tires that will not be handled during the cleanup.

6. Costs:

a. Comment:

RIDEM requested a more detailed breakdown of the costs that the State would incur as part of the Superfund remedial and post-remedial activities proposed at the site.

EPA Response:

EPA has held a meeting with RIDEM to present and discuss the costs that the State will incur as part of the remediation.

7. Site Access

a. Comment:

One citizen asked if the area would be fenced off to prevent or dissuade tampering or sabbotage. He also asked whether Mr. Davis would have access to the site.

EPA Response:

EPA will maintain a high level of security at the Davis Liquid site. The legal issue of Mr. Davis' access to areas of remediation is being evaluated at this time.

IV. REMAINING CONCERNS

There were several issues and concerns raised during the responsiveness summary that EPA should address during the remedial design and remedial action. These issues and concerns include the following:

(A) Availability of Remedial Design Information

There is considerable concern that new information gathered prior to remedial action be available for public review and comment. Particularly, citizens are concerned about the design specifications of the incinerator, and the proposed method of monitoring air emissions resulting from incineration and excavation of soils. EPA will continue to meet periodically with interested parties during the remedial design to discuss new information and design plans. EPA's Health and Safety Plan will be available for public review prior to the remedial action. This document will specify the details of the air monitoring program, health-based action levels, and emergency procedures. In addition, an informational public meeting will be held when the design is near completion.

(B) Availability of Air Monitoring Data

Residents are very concerned about potential contamination of the air in the area of the Davis Liquid site resulting from incineration and excavation of soils. Some citizens have requested access to air monitoring data collected during the remedial action. During the remedial action, EPA will conduct a rigorous air monitoring program to monitor air emissions from excavation and incineration. The specific details of public access to air monitoring data will be worked out during the remedial design, but results will be made available approximately every two weeks during the remedial action.

(C) Tire Pile

Residents continue to be concerned about the possibility of a second, perhaps more dangerous, tire fire. They feel that the placement of an incinerator on site increases the possibility that a fire will occur. Residents are concerned about the origin of the first tire fire, and remain concerned that additional wastes may be located underneath the tire pile.

(D) GSR Landfill

Residents continue to urge EPA to clean up the GSR landfill in addition to the Davis Liquid Superfund site.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES
AT THE
DAVIS LIQUID SITE

Community relations activities conducted at the Davis Liquid site to date have included:

- At a Town Council meeting in October 1984, EPA announced it had assumed the lead for cleanup activities at the site.
- EPA conducted community interviews as part of the community relations plan in January 1985.
- EPA mailed information updates, fact sheets, and press releases to the site community in July 1985, August 1985, September 1985, February 1986, June 1986, December 1986, January 1987, May 1987 and July 1987.
- EPA held a public meeting to discuss the results of the remedial investigation in January 1987.
- EPA held a public meeting and comment period on the proposed waterline in June 1987.
- EPA held a public meeting on the draft FS on July 21, 1987.
- EPA held a public hearing on the draft FS on August 6, 1987.
- EPA conducted a public comment period on the draft FS from July 22, 1987 to August 17, 1987.

Appendix B

Davis Liquid Waste Site

Responsiveness Summary, Waterline

DAVIS LIQUID WASTE SITE
Smithfield, Rhode Island

RESPONSIVENESS SUMMARY
EXPEDITED RESPONSE ACTION: WATERLINE

The U.S. Environmental Protection Agency (EPA) recently held a public comment period for interested parties to comment on the agency's proposal to install a waterline to service residents near the Davis Liquid Waste Superfund site who have private water supply wells. The waterline will be designed and constructed under the Expedited Response Action (ERA) provisions of the Superfund Amendments and Reauthorization Act (SARA).

EPA received written comments on the proposed waterline from May 28 to June 18, 1987 and received oral comments during a public meeting held in the site community on June 10, 1987. The ERA report was made available in two information repositories located in the site community and a press release and fact sheet were mailed to parties on the mailing list to notify them of the comment period and the availability of the ERA report.

The purpose of this responsiveness summary is to document EPA responses to the comments and questions that were raised during the public comment period, including those raised during the June 10, 1987 public meeting. All the comments summarized in this document will be factored into EPA's selection of the water supply source and service area.

This responsiveness summary is divided into four sections, as follows:

A. Overview: This section lists the proposed alternatives as presented in EPA's Expedited Response Action document and briefly summarizes public reaction to the alternatives.

B. Background on Community Involvement and Concerns: This section provides a brief history of community interest and concerns regarding the Davis Liquid Waste site.

C. Summary of Comments Received during the Public Comment Period and EPA Responses: This section summarizes written and oral comments received from the public and provides EPA responses. The comments are categorized by subject area.

D. Remaining Concerns: This section describes community concerns raised during the public comment period that EPA and the Rhode Island Department of Environmental Management will be aware of as they prepare to undertake design and construction of the waterline.

Attachment A to this responsiveness summary identifies the community relations activities conducted by EPA during the remedial response activities at the Davis site.

This responsiveness summary does not include comments concerning the feasibility study (FS) alternatives that address long-term cleanup of the

Davis site. EPA will conduct a public comment on the FS alternatives during July and August 1987 and a responsiveness summary will be prepared to accompany the final Record of Decision for site cleanup.

A. OVERVIEW

The ERA report proposed three areas to be serviced by the waterline (service areas). EPA chose a combination of sub-areas A and B as its preferred service area; these areas are described in more detail in the ERA report. Sub-Area A is the "affected area", which includes all residential properties where contamination has been identified and those which could potentially be contaminated in the future. Sub-Area B is a small area to the immediate north of Sub-Area A. Because there is much new development in this area, and because it borders the affected area, EPA has (selected) Sub-Area B as an additional preferred service area.

The ERA report proposed five potential water supply sources. Two of these five sources were selected as preferred alternatives: utilization of the Greenville Water District or the Smithfield Water System. Both of these alternatives will entail the extension of existing water distribution systems to supply the selected service area. Both of these water districts purchase water from the City of Providence.

In general, the reaction to the proposed alternatives has been very positive. Residents have expressed concern over the quality of their private well water for several years, and have made many requests for installation of a public water supply system. The majority of comments received during the public comment period concerned the logistics involved in the design and construction of the waterline, such as routing, cost to private individuals, consideration for fire protection, and the disruption of traffic.

B. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The potential contamination of private water supply wells located near the Davis site has been a major concern of local residents for more than ten years. In 1984 and 1985, EPA detected low levels of contamination in 23 residential wells near the site. Contaminants were detected in several of these wells at concentrations above EPA criteria for drinking water. Since discovery of this contamination, the Rhode Island Department of Environmental Management (RIDEM) has supplied bottled water to those residents whose wells showed contaminant levels above EPA criteria.

Residents living near the site that are not supplied with bottled water continue to live with the fear that their water may become, or already is, contaminated. In addition, all residents near the site use their well water for showering and bathing. It has been apparent at the most recent public meetings that potential water supply contamination continues to be of paramount concern to local residents.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

EPA held a public comment period on the proposed waterline from May 28 to June 18, 1987. EPA received five written comments during the public comment period. EPA also received oral comments during a public meeting held in the site community on June 10. At the time of the public meeting, EPA had announced its preferred alternatives for the waterline service area and the source of the water supply, as described in section A above.

The written and oral comments received during the public comment period are summarized below, along with EPA responses to these comments. Comments have been organized by subject matter into four categories: 1) water supply alternatives; 2) waterline service area; 3) waterline design; and 4) administrative issues.

1. Water Supply Alternatives

a. Comment: A resident asked what criteria EPA will use to decide between the Greenville and Smithfield water districts for the final water supply source.

EPA Response: EPA will look at the cost involved in utilizing each of the alternatives, whether they meet current standards, and whether they can meet the requirements of the proposed system.

b. Comment: The Greenville Water District, which is one of the preferred water supply sources, commented that it does not need approval of the Rhode Island state legislature to extend its district beyond its current boundary, as stated in an EPA fact sheet on the waterline. However, the District commented that it will need permission from the Town Council and the Providence Water Supply board to extend its boundaries within the town.

EPA Response: This comment was raised at the public meeting and EPA requested that the Greenville Water District clarify in a written comment the procedures for extending its boundaries. EPA appreciates the District's clarification of this matter. If the Greenville Water District is selected as the water supply source, EPA will gather more information on the procedures needed to extend the District's boundaries during design of the waterline.

c. Comment: The Superintendent of the Greenville Water District suggested that the Greenville and Smithfield systems be looped together to form a circular distribution system to supply water to the area. The Superintendent felt that there would be many benefits to this approach, including the provision of a water source for fire protection where none currently exists.

EPA Response: EPA is limited in budget and scope to actions which are necessary to protect the public health from contamination from the Davis site. In accordance with the Superfund law, EPA cannot cover the costs of improvements or expansions to existing systems. However, during design of the waterline, EPA could discuss with the Districts the sizing of pipes or other factors so that the Districts could make the connections, or other alterations, themselves.

d. Comment: A resident asked EPA whether the waterline was actually a "carrot" that EPA was giving residents in exchange for their acceptance of an experimental technology for site cleanup. The resident expressed concern that the dangers to residents posed by incineration, or other remedial technologies, could be greater than the dangers posed by contaminated water.

EPA Response: The reason EPA is considering the waterline is to protect the health of residents who are affected, or may be affected, by contamination from the Davis site. Regarding experimental technologies, EPA considers that all the technologies evaluated in the feasibility study are proven technologies. In addition, the alternatives must meet all state and federal criteria for pollution control and protection of public health. EPA will return to the site community in July to discuss the remedial alternatives for long-term cleanup and will hold a three-week public comment period to receive comments on the alternatives.

2. Waterline Service Area

a. Comment: Two residents of Burlingame Road questioned how far the waterline would extend along Burlingame Road from the intersection of Log Road.

EPA Response: The exact stopping point of the waterline on Burlingame Road will not be determined until survey work is completed, probably in the fall of 1937, but the waterline will extend at least one mile down Burlingame Road from the intersection of Log road.

b. Comment: A resident who owns property about 6/10 of a mile down Burlingame Road from the intersection of Log Road, expressed concern that contamination was discovered in a we
to the south of his property and that this well is at a hi
elevation than his land (which lies between the site and t

contaminated well). The resident believes that the ground water underlying his property and neighboring properties may be contaminated. He is preparing to build on his property and does not want to install a well because he fears it will be unsafe. The resident requested that EPA consider the installation of a waterline for a distance of at least one mile south of the intersection of Log and Burlingame Roads.

EPA Response: The exact location for service will be determined during the design phase of the waterline. This comment will be considered and subsequent testing of ground water will be conducted before the waterline is constructed. At this point, the EPA is assuming service down Burlingame Road for at least one mile.

c. Comment: A resident stated that, because EPA has limited funds to expend for the waterline, it should tie into the cheaper of the two preferred supplies and should not spend money on extending the line to lower Log Road along the western shore of Stump Pond because contamination has not been discovered in this area. He suggested that EPA consider connecting with the Smithfield Water Department at either Farnum Pike and Forge Rd. or at the continuation of Burlingame road in Wionhege Valley Estates. He also suggested an alternative connection point at the terminus of the Water District Lines on Tarkiln Road.

EPA Response: Although cost is a factor, the future migration of the contaminant plume needs to be considered. These suggestions will be analyzed during the design phase of the waterline, and an environmentally-protective as well as cost-effective service area will be determined.

d. Comment: The Administrator of the Hebert Nursing Home stated that he is located on Log Road about one-third mile south of the "affected area" and expressed his concern that EPA is not planning to extend the waterline to this area. The Administrator commented that the well supplying the nursing home is 420 feet deep and that the nursing home and the 30 neighboring residences are lower in elevatation than the Davis site by about 220 feet. He commented that the people in this area are very fearful of future contamination of their wells, and that this should warrant EPA's selection of the Greenville Water District to supply water to this area from Pleasant View Avenue.

EPA Response: The EPA has not determined whether the Hebert Nursing Home will be serviced by the waterline. However, studies conducted to date show that the contaminant plume is not moving in the general direction of the nursing home.

e. Comment: The Chief of the Smithfield Fire Department commented that the fire department would like to see the waterline run from Pleasantview Avenue up Flagg Road, for purposes of fire protection for the community.

EPA Response: The service area must be justified based on the results of water sampling and hydrogeological studies that have characterized the extent and movement of contaminated ground water. EPA cannot alter the service area to provide water for fire protection.

f. Comment: A resident of Linfield Court in East Smithfield commented that he and eight other families live two miles south of a Hunt Chemical facility and that the Town of Lincoln is installing public waterlines near the area but are stopping at the town line about a hundred feet from the houses. The resident stated that the Town of Lincoln told him that they will extend the lines into his area if the Town of Smithfield agrees but he has not been able to get a response from the Town of Smithfield.

EPA Response: EPA cannot get involved in this matter because it is not related to contamination from the Davis site. This is a situation that must be resolved between the resident and the two towns.

g. Comment: A resident asked whether EPA would bring water service into lots that are not yet developed.

EPA Response: EPA will bring a service connection up to the property line of the empty lot, and the owner can extend the service connection to the building(s) once the property is developed.

3. Waterline Design

a. Comment: The Smithfield Fire Department is concerned that water flow needs for fire suppression be included in the pipeline sizing and specifications. The Fire Department commented that the National Fire Protection Association codes should be referenced for water flow and pressure requirements.

EPA Response: The EPA plans to comply with all federal, state and local codes regarding fire protection. NFPA requirements will be considered during design.

b. Comment: Two residents asked whether EPA would cover the cos of hooking the service lines into the individual houses.
EPA Response: EPA will cover the costs for connecting the water service to homes currently existing.

c. Comment: A resident questioned whether EPA would compensate people for internal plumbing work that might be required to handle the higher operational pressure of the public water supply.

EPA Response: According to Superfund law, EPA is not able to pay for plumbing work inside individual houses but it is possible that the system could be designed so that water pressure reduction occurs outside of the houses.

d. Comment: Residents asked whether EPA would have to acquire land on the sides of the road, whether the road would have to be widened, and whether construction of the waterline would cause a disruption in traffic.

EPA Response: EPA is planning to place the waterline on the side of the road, within the existing right of way. EPA does not expect to have to acquire land or widen the road. If it is necessary for the pipeline to cross the road in order to negotiate a turn, EPA will arrange for assistance in directing traffic.

e. Comment: A resident asked whether EPA intends to resurface the roads after the waterline is installed and whether the agency would consider a cooperative arrangement with the town to resurface the roads.

EPA Response: EPA will only repave the area where the trench is dug. As far as cooperating with the town, if the town approached EPA and stated that they wanted to repave the entire road within EPA's design period, and wanted EPA pay for the paving of the trench area, this might be a possible arrangement. But EPA will not initiate an agreement with the town regarding the road work.

f. Comment: The Greenville Water District asked whether they would be allowed to have an inspector on the job, at government expense, to ensure that the work is conducted according to their rules and regulations.

EPA Response: EPA may be able to assume the cost of an inspector as part of the operation and maintenance costs for the first year of the project.

g. Comment: A resident asked what consideration EPA had given to the possibility of sewers being installed in these roads at some point in the future. He was concerned that room be made for sewer lines to be installed below, or across the road from, the waterline.

EPA Response: EPA will consider the possible future placement of sewer lines when designing the waterline route. This will be done after the survey work is completed.

h. Comment: A resident asked if any consideration had been given to the installation of a pipe gallery that would allow the waterline and other utility lines, i.e. for telephones and electricity, to be installed in the same trench.

EPA Response: This kind of a system would cost much more than the currently planned system. EPA could not pay for such a system, which would be an improvement to the town's services unrelated to the contamination from the Davis site.

4. **Administrative Issues**

a. Comment: At the public meeting on the waterline, a resident asked whether is was possible that the funds for installing the waterline would not be approved.

EPA Response: EPA responded that this was a possibility, but that if the waterline was not approved as an expedited response action, that it could be included as part of the long-term remedial action for the site.

b. Comment: The Smithfield Town Council commented that it is in concurrence with EPA's plan to extend waterlines to service residents near the Davis site, and that the Town Council is available to provide EPA with assistance on the project.

EPA Response: The EPA appreciates positive coordination from both local and state governments.

D. REMAINING CONCERNS

The primary concern that is likely to be raised during the design of the waterline is the route and the number of people serviced. There are many people in the area who are living day-to-day with a fear of contaminated water. Even if detailed studies show that certain wells are not likely to become contaminated due to the nature of the plume and the hydrogeology of the area, some people will continue to fear that their wells will become contaminated. EPA will periodically sample residential wells in the vicinity of the Davis site during the long-term remedial action to ensure that people who are not serviced by the waterline continue to be unaffected by the site.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES
AT THE
DAVIS LIQUID WASTE SITE

Community relations activities conducted at the Davis Liquid Waste site to date have included:

- At a Town Council meeting in October 1984, EPA announced it had assumed the lead for cleanup activites at the site.
- EPA conducted community interviews as part of the community relations plan in January 1985.
- EPA mailed information updates, fact sheets, and press releases to the site community in July 1985, August 1985, September 1985, February 1986, June 1986, December 1986, January 1987, and May 1987.
- EPA held a public meeting to discuss the results of the remedial investigation in January 1987.
- EPA held a public meeting on the waterline in June 1987.

Appendix C

Davis Liquid Waste Site

Administrative Record Index

Davis Liquid Waste

NPL Site Administrative Record Index

September 25, 1987

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

Prepared by

AMERICAN MANAGEMENT SYSTEMS, INC.
One Kendall Square, Suite 2200 • Cambridge, Massachusetts 02139 • (617) 577-9915

ADMINISTRATIVE RECORD INDEX

for the

Davis Liquid Waste NPL Site

1.0 Pre-Remedial Records

1. 1 Set of Sampling and Analysis Data, (Cover Letter Dated July 20, 1982), E.C. Jordan Co.
2. "Site Safety Plan" (September 8, 1982), Rhode Island Department of Environmental Management.
3. "Preliminary Site Assessment and Emergency Action Plan" (March 13, 1981), Ecology and Environment, Inc.
4. 1 Hazard Ranking System Report (October 6, 1982), EPA Region I.

2.0 Removal Response

2.1 Correspondence

1. 3 Letters from EPA Region I to the Rhode Island Department of Environmental Management (April 15, 1985; June 16, 1986 - 3 Copies; September 9, 1986).
2. 13 Internal EPA Region I Letters (March 3, 1982; July 23, 1985; August 12, 1985; September 24, 1985; October 4, 1985; October 7, 1985; December 3, 1985 - 2 Copies; January 31, 1986; June 5, 1986; March 5, 1987; May 18, 1987; August 6, 1987; August 12, 1987).
3. 2 Sets of Internal Camp Dresser and McKee, Inc. Notes (August 19, 1986; June 5, 1987).
4. 2 EPA Region I Telephone Notes (January 2, 1986; January 24, 1986), EPA Region I/Camp Dresser and McKee, Inc.
5. 1 Letter from EPA Region I to Camp Dresser and McKee, Inc. (April 21, 1986).
6. 1 EPA Region I Telephone Note (June 1, 1987), EPA Region I/Smithfield Town Council).
7. 1 Letter from the Rhode Island Department of Health to EPA Region I (June 5, 1987).

2.2 Expedited Response Action Documents

1. "Description of the Current Situation and Proposed Expedited Response Action" (September, 1986), Camp Dresser and McKee, Inc.
2. "Description of the Current Situation and Proposed Expedited Response Action" (February, 1987), Camp Dresser and McKee, Inc.
3. "Draft Technical Memorandum - Description of the Current Situation and Proposed Response" (July, 1986), Camp Dresser and McKee, Inc.

Comments

4. 1 Set of Comments from EPA Region I to Camp Dresser and McKee, Inc. on the July, 1986 "Draft Technical Memorandum - Description of the Current Situation and Proposed Response" (Set of Comments Dated August 6, 1986 - 2 Copies).

2.3 Sampling and Analysis Data

Contains No Records.

2.4 Pollution Reports (POLREPs)

1. "POLREP #2" (August 8, 1986), EPA Region I.
2. "POLREP #3" (September 3, 1985), EPA Region I.
3. "POLREP #4" (September 9, 1985), EPA Region I.
4. "POLREP #5" (November 13, 1985), EPA Region I.
5. "POLREP #6" (November 27, 1985), EPA Region I.
6. "POLREP #7" (January 13, 1986 - 2 Copies), EPA Region I.
7. "Final POLREP" (February 4, 1986 - 2 Copies), EPA Region I.

2.5 On-Scene Coordinator Report

1. 1 On-Scene Coordinator Report, Haworth, R., EPA Region I.

2.6 Contractor Work Plans and Progress Reports

Contains No Records.

2.7 Cost Reports and Invoices

All Documents in this Minor Break are Excluded from the Administrative Record.

3.0 Remedial Investigation (RI)

3.1 Correspondence

1. 3 Sets of Internal EPA Region I Telephone Notes (February 18, 1986; March 19, 1986; date not available for 1 Set of Notes).
2. 1 Set of EPA Region I Notes to File.
3. 2 Letters from EPA Region I to the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (December 18, 1985; January 23, 1986).
4. 1 Letter from the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry to EPA Region I (April 11, 1986).
5. 2 Internal EPA Region I Letters (March 20, 1986 - 2 Copies; April 10, 1986 - 2 Copies).
6. 5 Letters from the Rhode Island Department of Environmental Management to EPA Region I (May 5, 1982; May 12, 1982; July 19, 1985; January 10, 1986; February 26, 1986).

7. 5 Letters from EPA Region I to the Rhode Island Department of Environmental Management (December 7, 1984; April 15, 1985; May 6, 1985; July 9, 1985; March 28, 1986).
8. 1 Internal Rhode Island Department of Environmental Management Letter (July 5, 1985).
9. "Potential Hazardous Waste Site Tentative Disposition" (June 1, 1980), EPA Region I.
10. 1 Letter from EPA Region I to the U.S. Geological Survey (January 30, 1986).
11. 1 Letter from EPA Region I to a Member of Public.

3.2 Sampling and Analysis Data

1. "Private Well Laboratory Results, Davis Liquid Chemical Site, Smithfield, Rhode Island" (10 Volumes), Camp Dresser and McKee, Inc.
2. "Lab Data for Davis Liquid Chemical Site" (2 Volumes) (September 11, 1985), Camp Dresser and McKee, Inc.
3. "Private Wells Invalidated Volatile Organic Data" (April 2, 1985), EPA Region I.
4. 8 Sets of "Volatile Organics Analysis" Data Sheets (1 Set Collected March 9, 1985 and Received by EPA Region I July 10, 1985; 2 Sets Collected July 11, 1985; 1 Set Collected August 6, 1985 through August 9, 1985 and Received by EPA Region I November 13, 1985; 1 Set Validated by EPA Region I May 23, 1985; 2 Sets Received by EPA Region I May 31, 1985; date not available for 1 Set of Data Sheets).
5. 6 Sets of "Certificate of Analysis" Reports from R.I. Analytical Laboratories, Inc. (4 Sets Received October 24, 1985; 1 Set Received November 5, 1985 - 2 Copies; 1 Set Received January 23, 1986 - 2 Copies).

3.3 Scopes of Work

All Documents in this Minor Break are Excluded from the Administrative Record.

3.4 Interim Deliverables

1. "Davis Liquid Chemical Waste Disposal Site: Smithfield, Rhode Island - Remedial Investigation Preliminary Data Compilation and Analysis" (November 22, 1985), Camp Dresser and McKee, Inc.

Comments

2. 1 Set of Comments from the Rhode Island Department of Environmental Management on "Davis Remedial Investigation Data Compilation and Analysis II" (Set of Comments Dated February 26, 1986).
3. 1 Set of Comments from EPA Region I to Camp Dresser and McKee, Inc. on "Davis Remedial Investigation Data Compilation and Analysis II" (Set of Comments Dated March 11, 1986).

3.5 Applicable or Relevant and Appropriate Requirements

Contains No Records.

3.6 Remedial Investigation (RI) Reports

1. "Draft Remedial Investigation" (November, 1986), Camp Dresser and McKee, Inc.
2. "Draft Remedial Investigation Appendix" (2 Volumes) (November, 1986), Camp Dresser and McKee, Inc.

3.7 Contractor Work Plans and Progress Reports

1. 7 Progress Reports (September, 1984; March, 1985 - 2 Copies; April, 1985; August, 1986 - 2 Copies; September, 1986 - 3 Copies; November, 1986; April, 1987), Camp Dresser and McKee, Inc.
2. 1 Amendment (November 13, 1984), Camp Dresser and McKee, Inc.

3.8 Cost Reports and Invoices

All Documents in this Minor Break are Excluded from the Administrative Record.

4.0 Feasibility Study (FS)

4.1 Correspondence

1. 1 Letter from the Rhode Island Department of Environmental Management to EPA Region I (March 12, 1987).
2. 1 Internal Rhode Island Department of Environmental Management Letter (June 18, 1985).
3. 2 Sets of Internal Camp Dresser and McKee, Inc. Notes (July 8, 1986; August 7, 1986).

4.2 Sampling and Analysis Data

1. 1 Set of "Organics Analysis Data Sheets" (Received by EPA Region I April 17, 1985), GCA Corporation.
2. 1 Set of Well Sampling Data, Camp Dresser and McKee, Inc.
3. 1 Set of Private Well Data, Camp Dresser and McKee, Inc.
4. 2 Sets of Sampling and Analysis Data (April 8, 1987 through April 13, 1987), Camp Dresser and McKee, Inc.
5. 1 Set of "Organics Analysis Data Sheets" (Cover Letter Dated April 16, 1987), Southwest Laboratory of Oklahoma, Inc.

4.3 Scopes of Work

All Documents in this Minor Break are Excluded from the Administrative Record.

4.4 Interim Deliverables

Contains No Records.

4.5 Applicable or Relevant and Appropriate Requirements

1. Smithfield Code § 19-36 - 19-49

4.6 Feasibility Study (FS) Reports

1. "Preliminary Draft Feasibility Study" (November, 1986), Camp Dresser and McKee, Inc.
2. "Feasibility Study" (April, 1987), Camp Dresser and McKee, Inc.
3. "Feasibility Study Appendix" (April, 1987), Camp Dresser and McKee, Inc.

4.7 Contractor Work Plans and Progress Reports

1. 2 Progress Reports (December, 1986; January, 1987), Camp Dresser and McKee, Inc.

4.8 Cost Reports and Invoices

All Documents in this Minor Break are Excluded from the Administrative Record.

5.0 Record of Decision (ROD)

5.1 Correspondence

Contains No Records.

5.2 Applicable or Relevant and Appropriate Requirements

1. 1 Set of State of Rhode Island Applicable or Relevant and Appropriate Requirements (ARARs).

5.3 Responsiveness Summary

1. "Davis Liquid Waste Site: Smithfield, Rhode Island - Responsiveness Summary - Expedited Response Action: Waterline" (July 1, 1987), EPA Region I.

5.4 Record of Decision (ROD)

Contains No Records.

5.5 Contractor Work Plans and Progress Reports

All Documents in this Minor Break are Excluded from the Administrative Record.

5.6 Cost Reports and Invoices

All Documents in this Minor Break are Excluded from the Administrative Record.

6.0 Remedial Design (RD)

All Documents in this Major Break are Excluded from the Administrative Record.

7.0 Remedial Action (RA)

All Documents in this Major Break are Excluded from the Administrative Record.

8.0 Site Closeout

All Documents in this Major Break are Excluded from the Administrative Record.

9.0 State Coordination

9.1 Correspondence

1. "Field Investigation Report" (January 10, 1983), Rhode Island Department of Environmental Management .
2. 3 Sets of EPA Region I Telephone Notes (June 21, 1982; October 9, 1984; February 5, 1985), EPA Region I/Rhode Island Department of Environmental Management.
3. 17 Letters from the Rhode Island Department of Environmental Management to EPA Region I (August 14, 1981; December 9, 1981; December 10, 1981; January 22, 1982; April 29, 1982; May 5, 1982; June 16, 1982; July 12, 1982; August 19, 1982 - 2 Copies; September 9, 1982 - 2 Copies; February 24, 1983; August 15, 1984; October 22, 1984; December 17, 1984; May 31, 1985; November 21, 1985; January 29, 1986).
4. 5 Letters from EPA Region I to the Rhode Island Department of Environmental Management (April 27, 1982 - 2 Copies; September 15, 1987; October 18, 1982; December 13, 1982; March 1, 1985).
5. 1 Letter from EPA Region I to the Smithfield Town Council (June 3, 1982).
6. 1 Letter from the Governor of the State of Rhode Island to EPA Region I (June 28, 1982).
7. 1 Letter from EPA Region I to the Governor of the State of Rhode Island (April 30, 1981).
8. 15 Internal EPA Region I Letters (February 3, 1982; March 3, 1982; March 8, 1982; March 10, 1982; April 29, 1982; April 29, 1982; April 30, 1982; July 16, 1982; July 19, 1982; March 18, 1983; December 13, 1984; February 19, 1985; March 20, 1985; June 5, 1986; date not available for 1 Letter).
9. 3 Sets of EPA Region I Notes to File (January 3, 1983; February 4, 1985; February 20, 1985).
10. 1 Set of Internal EPA Region I Telephone Notes (October 1, 1982).

9.2 Cooperative Agreements

1. 3 Assistance Amendments for the Cooperative Agreement (March 8, 1983 - 2 Copies; March 8, 1984 - 2 Copies; July 10, 1984 - 2 Copies), State of Rhode Island.
2. 1 Revised "Work Diagram" for the Cooperative Agreement (March 18, 1983), State of Rhode Island.
3. "Procurement System Checklist" (November 9, 1983).
4. 9 "State and Local Nonconstruction Programs" Forms for the Cooperative Agreement (December 1, 1981; April 29, 1982 - 3 Copies; December 2, 1983 - 2 Copies; September 4, 1984; September 27, 1984 - 2 Copies; October 22, 1984 - 2 Copies; December 13, 1984 - 3 Copies; January 23, 1985; March 19, 1985 - 2 Copies), State of Rhode Island.

5. 4 Sets of EPA Region I Notes to File (January 5, 1984; October 1, 1984; January 29, 1985; February 6, 1985).
6. 3 "Project Descriptions" for the Cooperative Agreement, State of Rhode Island.
7. "Davis Liquid Waste Site Superfund Special Conditions" for the Cooperative Agreement, State of Rhode Island.
8. 3 "Assistance Agreement/Amendment" Forms for the Cooperative Agreement (July 23, 1982 - 6 Copies; dates not available for 2 Forms), State of Rhode Island.
9. 1 Set of EPA Region I Draft Revisions for the Schedule, Budget, and Special Conditions of the Cooperative Agreement, State of Rhode Island.
10. 1 Set of EPA Region I Revisions for the Schedule, Budget, and Special Conditions of the Cooperative Agreement (February 7, 1984), State of Rhode Island.
11. 1 Set of EPA Region I Draft Special Conditions for the Cooperative Agreement, State of Rhode Island.
12. "Cooperative Agreement for Remedial Planning Actions" (July 16, 1982), State of Rhode Island.
13. 1 EPA Region I Draft Total Project Budget Revision for the Cooperative Agreement, State of Rhode Island.
14. 1 Total Project Budget Revision for the Cooperative Agreement (September 30, 1984), State of Rhode Island.
15. "Davis Liquid Waste Site Cooperative Agreement" (February 19, 1985), State of Rhode Island.
16. "Davis Liquid Waste Site Cooperative Agreement" (February 19, 1985 and Amended March 20, 1985), State of Rhode Island.
17. "Notice of Intent to Apply for Federal Aid" (January 21, 1982).

9.3 State Contracts

Contains No Records.

9.4 Status of State Assurances

1. 1 Internal EPA Region I Letter (June 11, 1986 - 3 Copies).

9.5 Quarterly Progress Reports

Contains No Records.

9.6 Quarterly Financial Reports

Contains No Records.

10.6 PRP-Specific Negotiations

All Documents in this Minor Break are Excluded from the Administrative Record.

10.7 Administrative Orders

1. 12 "Orders" (October 3, 1978 - 4 Copies; January 22, 1980; July 28, 1980; March 13, 1981 - 4 Copies; November 24, 1981 - 4 Copies; May 4, 1983 - 8 Copies; June 6, 1983 - 4 Copies; July 7, 1983; January 4, 1984 - 13 Copies; June 10, 1985; June 13, 1985; September 26, 1985 - 3 Copies).
2. 2 "Supplemental Orders" (October 16, 1981 - 8 Copies; date not available for 1 Supplemental Order - 7 Copies).
3. "Second Supplemental Order" (February 22, 1984 - 14 Copies).
4. "Decision and Order" (November 27, 1984 - 5 Copies).
5. "Motion to Amend Order" (January 16, 1984 - 2 Copies).
6. "Amended Order and Judgement."
7. "Immediate Measure and Remedial Order" (March 8, 1985).
8. "Memorandum of Points and Authorities in Support of the United States' Motion for a Temporary Restraining Order" (June 10, 1985).

10.8 Consent Decrees

1. "Final Consent Decree" (June 22, 1978).
2. 1 Letter from EPA Region I to the Rhode Island Department of Environmental Management (May 11, 1987).
3. "Consent Order."

10.9 Pleadings -- Directly Related to Trial (Current Enforcement Activity)

1. "Complaint," William Davis, Sr., Eleanor Davis, William Davis, Jr. and Nancy Davis.
2. "Reply Memorandum to Defendants" (September 14, 1977).
3. "Answer of William Davis to Plaintiffs' Interrogatories" (July 18, 1983 - 4 Copies).
4. "Answers to Interrogatories" (December 11, 1982).
5. "Answer to Defendants' Counterclaim" (December 15, 1977 - 2 Copies).
6. "Answer of Defendants, Counterclaim and Claim of Jury Trial" (November 21, 1977 - 2 Copies).
7. "Answers of William Davis, Sr." (March 25, 1985 - 2 Copies).
8. "Supplemental Responses of William Davis, Sr." (April 22, 1985).

10.10 Trial Documents

1. "Decision" (September 20, 1977).
2. "Opinion" (March 12, 1985).

10.11 PRP Enforcement Work Plans

Contains No Records.

11.0 Potentially Responsible Party (PRP)

11.1 PRP Lists

All Documents in this Minor Break are Excluded from the Administrative Record.

11.2 Contractor-Related Correspondence

All Documents in this Minor Break are Excluded from the Administrative Record.

11.3 Contractor Work Plans and Progress Reports

Contains No Records.

11.4 Cost Reports and Invoices

All Documents in this Minor Break are Excluded from the Administrative Record.

11.5 Site Level - General Correspondence

Contains No Records.

11.6 Site Level - Evidence - Government Agency Documents

Contains No Records.

11.7 Generator Committee Documents

1. "Legal Responsibility of Parties for EPA Costs and Cleanup Activities," Jamie W. Katz, EPA Region I (2 Copies).
2. "Davis Liquid Waste Site General Information."

11.8 Site-Specific Contractor Deliverables

All Documents in this Minor Break are Excluded from the Administrative Record.

11.9 PRP-Specific Correspondence

1. 1 Mailing List of Potentially Responsible Parties.
3. 1 List of Potentially Responsible Parties that Received Notice Letters (February 25, 1986).
4. 1 Example Notice Letter.

11.10 PRP-Specific Evidence - Government Agency Documents

1. "United States Bankruptcy Court for the District of Rhode Island" Form (December 19, 1985), Octeau Bros. Company.
2. 1 Insurance Policy (Policy Period from December 1, 1976 to December 1, 1977), Octeau Brothers, Inc. & Octeau Realty.

11.11 PRP-Specific Evidence - Transactional Documents

All Documents in this Minor Break are Excluded from the Administrative Record.

11.12 PRP Related Documents

All Documents in this Minor Break are Excluded from the Administrative Record.

11.13 Financial Status Documents

All Documents in this Minor Break are Excluded from the Administrative Record.

11.14 Title Searches

1. 1 Assignment of Mortgage, Capuano, L., Capuano, D. and DiBiasio, L. Property (August 30, 1976 - 2 Copies).
2. 1 Assignment of Mortgage, Davis, W. Property (August 27, 1976 - 2 Copies).
3. 1 Assignment of Mortgage, Davis, W. Property (August 27, 1976).
4. 1 Assignment of Mortgage, Roberts, W. and Lebewohl, R. Property (August 7, 1974 - 2 Copies).
5. 1 Assignment of Mortgage, Roberts, W. and Lebewohl, R. Property (August 20, 1974 - 2 Copies).
6. 1 Corrective Quitclaim Deed, Davis, W., Jr. Property (November 29, 1980 - 2 Copies).
7. "Davis Liquid Waste Site Parcel Boundary Mapping Project" (Cover Letter Dated January 22, 1986), Prepared by Anthony E. Muscatelli and Associates, Inc. and Submitted by GCA Corporation.
8. "Financing Statement" (March 11, 1984 - 2 Copies).
9. 1 Internal EPA Region I Letter (April 8, 1985).
10. "Land Ownership" Report (Cover Letter Dated January 17, 1985 - 4 Copies), Camp Dresser and McKee, Inc.
11. "Lot Map and List of Lots and Owners."
12. "Map #50 and List of Lots and Owners."
13. 1 Mortgage, Ronci, S. Property (August 19, 1981 - 2 Copies).
14. 1 Mortgage Deed, Davis, N. Property (March 22, 1984).
15. 1 Mortgage Deed, Davis, N. Property (March 26, 1984).
16. 1 Mortgage Deed, Davis, W. Property.
17. 1 Mortgage Deed, Davis, W. Property (June 16, 1972).
18. 1 Mortgage Deed, Fernandes, D. Property (February 11, 1985 - 2 Copies).
19. 1 Mortgage Deed, Lockwood, L. Property (December 15, 1964 - 2 Copies).
20. 1 Mortgage Deed, Parr, W. Property (January 17, 1984 - 2 Copies).
21. 1 Mortgage Deed, Potter, B. Property (April 13, 1981 - 2 Copies).
22. 1 Mortgage Deed, Realty Income Trust Property (December 31, 1980 - 3 Copies).
23. 1 Mortgage Deed, Rhode Island Housing and Mortgage Finance Corporation Property (March 22, 1984).
24. 1 Mortgage Deed, Sullivan, J. Property (August 7, 1974 - 2 Copies).
25. 1 Option To Purchase, IDES, Inc. Property (October 3, 1980 - 2 Copies).
26. 1 Quitclaim Deed, Davis, E. Property (December 15, 1964 - 2 Copies).
27. 1 Quitclaim Deed, Davis, N. Property (December 13, 1983 - 2 Copies).
28. 1 Quitclaim Deed, Davis, W. Property (September 4, 1980 - 2 Copies).

29. 1 Quitclaim Deed, Davis, W. Property (February 25, 1981).
30. 1 Request For Certificate, Buteau, D. Property (February 11, 1985 - 2 Copies).
31. 1 Title Search (Cover Letter Dated October 21, 1985 - 2 Copies), Performed by Ticor Title Insurance Company and Submitted by GCA Corporation.
32. "Title Search Task," GCA Corporation.
33. 1 Warranty Deed, Davis, N. Property (January 26, 1984 - 2 Copies).
34. 1 Warranty Deed, Davis, N. Property (March 26, 1984).
35. 1 Warranty Deed, Davis, N. Property (February 11, 1985 - 2 Copies).
36. 1 Warranty Deed, Davis, W. Property (August 7, 1974 - 2 Copies).
37. 1 Warranty Deed, Davis, W. Property (December 31, 1980 - 4 Copies).
38. 1 Warranty Deed, Davis, W., Jr. Property (August 1, 1980 - 2 Copies).

12.0 Cost Recovery

All Documents in this Major Break are Excluded from the Administrative Record.

13.0 Community Relations

13.1 Correspondence

1. "Security Support for On-Scene Coordinators at Hazardous Waste Sites" (August, 1985), EPA Headquarters.
2. 2 Sets of EPA Region I Telephone Notes (October 15, 1985; January 8, 1986), EPA Region I/Members of Public.
3. 1 Letter from the Greenville Water District to EPA Region I (June 11, 1987).
4. 1 Letter from Hebert Nursing Home, Inc. to EPA Region I (June 11, 1987).
5. 1 Letter from EPA Region I to ICF/Clement Associates, Inc. (February 27, 1985).
6. 1 Set of EPA Region I Telephone Notes (January 2, 1985), EPA Region I/ICF/Clement Associates, Inc.
7. 1 Set of EPA Region I Meeting Notes (May 20, 1986), Meeting With ICF/Clement Associates, Inc.
8. 1 Set of EPA Region I Meeting Notes (November, 1985), Meeting With Members of Public.
9. 1 Letter from a Member of Public to EPA Region I (June 12, 1987).
10. 1 Letter from the Rhode Island Department of Environmental Management to EPA Region I (May 22, 1984).
11. 1 Rhode Island Department of Environmental Management Internal Letter (September 3, 1986).
12. 2 Letters from EPA Region I to the Rhode Island Department of Environmental Management (September 15, 1982; November 9, 1982).
13. 1 Set of EPA Region I Telephone Notes (November 20, 1984), EPA Region I/Rhode Island Department of Environmental Management.
14. 5 Letters from the Smithfield Town Council to EPA Region I (May 14, 1982; March 6, 1985; November 20, 1985; May 20, 1986 - 2 Copies; June 15, 1987).
15. 1 Letter from the Smithfield Fire Department to EPA Region I (June 15, 1987).
16. 4 Letters from EPA Region I to the Smithfield Town Council (January 1, 1985 - 2 Copies; February 26, 1985 - 2 Copies; May 31, 1985; date not available for 1 Letter).

17. 8 Sets of EPA Region I Telephone Notes (April 24, 1985; July 1, 1985; July 9, 1985; October 22, 1985; November 7, 1985; December 3, 1985; December 9, 1985; April 3, 1986), EPA Region I/Smithfield Town Council.
18. 3 Internal EPA Region I Letters (December 4, 1985; January 29, 1986 - 2 Copies; March 24, 1987).
19. 7 Sets of Internal EPA Region I Telephone Notes (October 11, 1984; October 30, 1984; December 11, 1984; December 28, 1984; February 5, 1985; November 5, 1985; November 26, 1985).
20. 2 "Proposed Plans for Davis Liquid Waste Site" (July 14, 1987; July 15, 1987), EPA Region I.
21. 1 Set of EPA Region I Telephone Notes (December 19, 1984) EPA Region I/Camp Dresser and McKee, Inc.
22. 1 Petition from Humans Organized to Protect our Environment (HOPE for Northern Rhode Island) to EPA Region I (October 23, 1984 - 2 Copies).
23. 1 Letter from EPA Region I to EPA Headquarters (November 9, 1982).

13.2 Community Relations Plan

1. "Final Community Relations Plan - Davis Liquid Waste Site, Smithfield, Rhode Island" (February, 1986), EPA Region I.

13.3 News Clippings/Press Releases

1. 2 Internal EPA Region I Letters (May 20, 1982; date not available for 1 Letter).
2. 8 Press Releases Issued by EPA Region I (August 20, 1985 - 8 Copies; September 30, 1985 - 3 Copies; February 6, 1986 - 2 Copies; December 3, 1986; July 13, 1987; August 10, 1987; dates not available for 2 Press Releases).
3. 1 Press Release Issued by the Governor of the State of Rhode Island (July 17, 1980).
4. 104 News Clippings from the Following Newspapers:
   - The Boston Globe - Boston, MA
   - Derry News - Derry, NH
   - Evening Bulletin - Providence, RI
   - Journal-Bulletin - Providence, RI
   - Newport Daily News - Newport, RI
   - Observer - Greenville, RI
   - Pawtuxet Valley Daily Times - West Warwick, RI
   - Providence Journal - Providence, RI
   - The Providence Sunday Journal - Providence, RI
   - Woonsocket Call - Woonsocket, RI

13.4 Public Meetings

1. 3 Sets of Public Meeting Practice Questions (June 10, 1987; June 21, 1987; date not available for 1 Set of Questions).
2. 8 Sets of EPA Region I Meeting Notes (July 26, 1983; October 23, 1984; January 8, 1985; January 8, 1985; June 24, 1986; June 24, 1986; June 10, 1987; August 6, 1987), Meetings With Members of Public.
3. 2 Letters from the Smithfield Town Council to EPA Region I (July 17, 1984; August 8, 1984).
4. 1 Set of EPA Region I Telephone Notes (October 23, 1984), EPA Region I/ Rhode Island Department of Environmental Management.
5. 2 EPA Region I Public Meeting Agendas (October 23, 1984; June 24, 1986).

6. 1 EPA Region I "Project Outline" (October 23, 1984).
7. 1 Set of Camp Dresser and McKee, Inc. Meeting Notes (June 24, 1986), Meeting With Members of Public.
8. 1 Public Meeting Notice (June 5, 1986 - 3 Copies).
9. "Summary of RI Public Meeting," EPA Region I.
10. "Summary of FS Public Meeting," EPA Region I.
11. 6 Sets of EPA Region I Notes to File (Spring, 1986; June 24, 1986; June 24, 1986; June 10, 1987; July 22, 1987; July 23, 1987).
12. "A Brief History of the Davis Chemical Dump in Smithfield, Rhode Island," EPA Region I.

13.5 Fact Sheets

1. 7 Superfund Program Fact Sheets (September, 1985 - 6 Copies; June, 1986 - 6 Copies; December, 1986 - 2 Copies; January, 1987; May, 1987; July, 1987; September, 1987).

13.6 Technical Assistance Grants

Contains No Records.

14.0 Congressional Inquiries/Hearings

14.1 Correspondence

Contains No Records.

14.2 Transcripts

Contains No Records.

14.3 Testimonies

Contains No Records.

14.4 Published Hearing Records

Contains No Records.

15.0 Freedom of Information Act (FOIA) Management

All Documents in this Major Break are Excluded from the Administrative Record.

16.0 Natural Resource Trustee

16.1 Correspondence

1. 1 Set of EPA Region I Telephone Notes (June 11, 1985), EPA Region I/ U.S. Department of the Interior.
2. 1 Letter from EPA Region I to the U.S. Department of the Interior (June 20, 1985 - 2 Copies).
3. 1 Letter from the U.S. Department of the Interior to EPA Region I (July 21, 1987 - 2 Copies).
4. 1 Letter from the U.S. Department of the Interior to EPA Headquarters (January 16, 1986).

16.2 Interagency Agreements/Memoranda of Understanding

Contains No Records.

16.3 Natural Resource Trustee Release

Contains No Records.

16.4 Trustee Notification Form and Selection Guide

Contains No Records.

16.5 Technical Issue Papers

Contains No Records.

17.0 Site Management Records

17.1 Correspondence

All Documents in this Minor Break are Excluded from the Administrative Record.

17.2 Access Agreements

Contains No Records.

17.3 Site Security

All Documents in this Minor Break are Excluded from the Administrative Record.

17.4 Site Photographs/Maps

Contains No Records.

17.5 Site Descriptions/Chronologies

All Documents in this Minor Break are Excluded from the Administrative Record.

17.6 Site Management Plans

All Documents in this Minor Break are Excluded from the Administrative Record.

Appendix D

Davis Liquid Waste Site

State Concurrence Letter

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
OFFICE OF LEGAL SERVICES
9 Hayes Street
Providence, R.I. 02908
(401)277-2771

September 29, 1987

Mr. Michael Deland, Regional Administrator
Environmental Protection Agency
JFK Federal Building
Government Center
Boston, MA 02203

Dear Mr. Deland:

The purpose of my writing is to express the state's concurrence with the cleanup of the Davis site. We have the following comments concerning the draft record of decision you transmitted to the staff on Friday.

1. On page 77 the EPA rejects a cleanup standard of 10^{-6} and 10^{-7} for the groundwater based on the fact that the alternate water supply will eliminate exposure.

   The Department's concern is that significant additional residential development will occur in the potentially contaminated areas surrounding the site.

   The design of the water system should take into consideration this predictable development pressure.

2. Due to unknown waste quantities (failing E. P. tox) that are proposed for the subtitle C facility on site, we would request that provisions be made to reevaluate the remedy and amend the ROD should the estimates prove substantially inaccurate. If only a small amount of residential waste remains after incineration, consideration should be given to off-site disposal.

3. Although the ROD does indicate that there exists no A.R.A.R.s for this site (p. 78), be advised that the state has recently promulgated air toxics standards and is in the process of developing groundwater classification and cleanup standards. We would request that these standards be considered during the design phase of the cleanup.

Based on our recent conversation we have expedited the review of the ROD and have completed such in two (2) business days.

This turnaround was at your request based on assurances that this project will be funded in the current fiscal year and remediation will proceed quickly.

Very truly yours,

RLB/bm

Robert L. Bendick, Jr.
Director

Table 3
DAVIS SITE
SUMMARY OF SOURCE CONTROL ALTERNATIVE SCREENING

Alternatives Developed in this Section		Alternatives Screened Out		Alternatives Retained for Detailed Development	
No Action				No Action	
SC-1	No Action			SC-1	No Action
Onsite Treatment		Onsite Treatment		Onsite Treatment	
SC-2	Low Temperature Thermal Treatment	SC-3	Soil Washing Reference NCP (300.68)(g)(2) Acceptable Engineering Practices	SC-2	Low Temperature Thermal Treatment
SC-3	Soil Washing	SC-5	Composting Reference NCP (300.68)(g)(2) Acceptable Engineering Practices	SC-4	Thermal Destruction
SC-4	Thermal Destruction				
SC-5	Composting				
Onsite Containment		Onsite Containment			
SC-6	RCRA Landfilling	SC-6	RCRA Landfilling Reference SARA 121(b)		
Offsite Treatment		Offsite Treatment		Offsite Treatment	
SC-7	RCRA Landfilling	SC-7	RCRA Landfilling Reference SARA 121(b)	SC-8	Thermal Destruction
SC-8	Thermal Destruction				